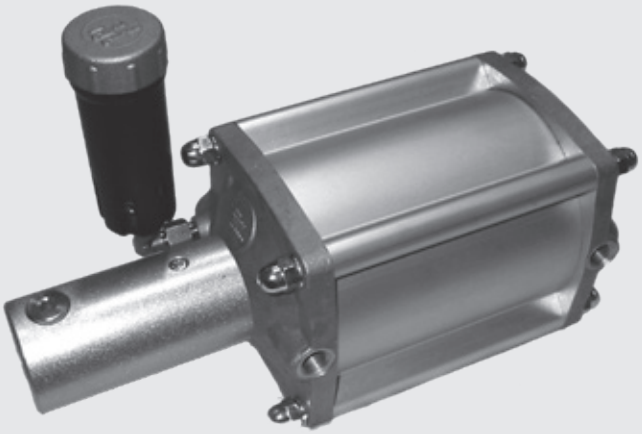
AIR/OIL PRESSURE MULTIPLIERS

The pressure multiplier uses a combination of air and oil to generate considerable pressures.
The principle is based on the difference of the surface of the two pistons, which are connected by a single piston rod, so the pressure increases in proportion to the ratio of the two areas. The circuit is connected to the oil container allowing automatic compensation for minor leakage at each stroke. The pressure multipliers can be mounted in any position, but the recovery tank must be positioned vertically, higher than the multiplier. The use of FRL units of a suitable capacity in Nl/min is required for efficient air treatment. It is advisable to mount a non-return valve before the pneumatic valve for use when the compressed air supply fails.



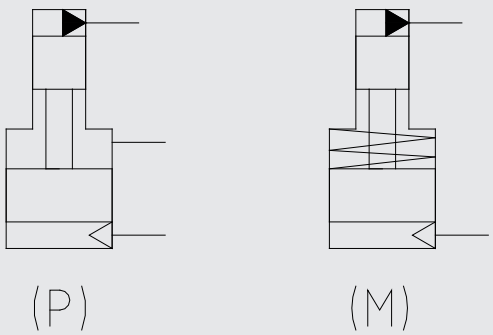
TECHNICAL DATA		SERIE 01	SERIE 02	SERIE 03
Bore	mm	100	100	160
Volume of oil supplied	cm^3	11÷57	31÷196	19÷192
Compression ratio		20:1÷39:1	4:1÷12,5:1	20:1÷52:1
Maximum pneumatic input pressure	bar	8	8	10
Maximum hydraulic output pressure	bar	312	100	500
Working temperature range	°C	-10°÷+70		
Recommended oil		TORQUE O MATIC D II ATF		
Fluid		Filtered lubricated or unlubricated air If lubricated air is used, lubrication must be continuous		

APPLICATIONS

For operating single-acting and dual-acting hydraulic cylinders.
Clamping tools, vices, dies and moulds, device for bending, cutting, punching, drawing, calking and marking, and riveting modules.

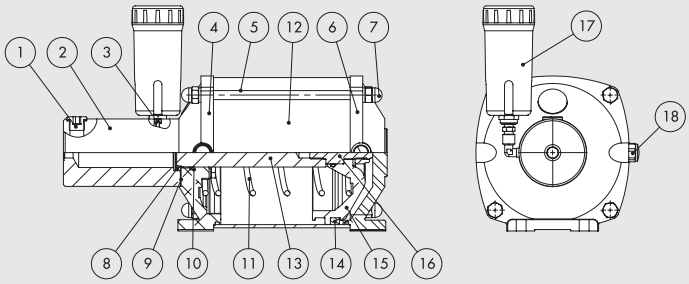
(P) = COMPRESSED-AIR RETURN

(M) = SPRING-LOADED RETURN



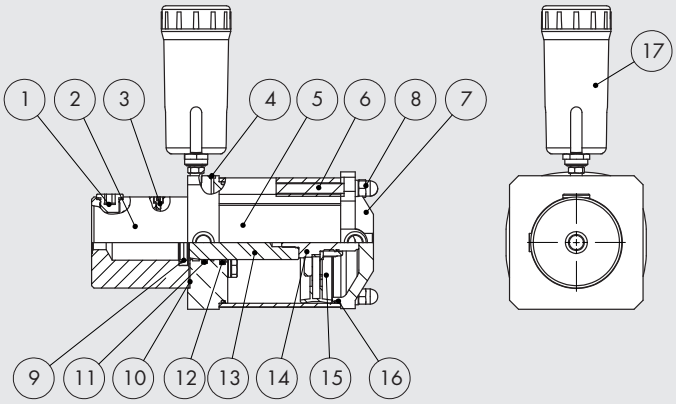
COMPONENTS FOR MULTIPLIERS 01 AND 03

① TRF CAP: galvanised steel
② OIL CHAMBER: painted steel
③ BLEED SCREW: galvanised steel
④ FRONT HEAD: forged aluminium
⑤ TIE RODS: galvanised steel
⑥ REAR HEAD: forged aluminium
⑦ BLIND NUT: galvanised steel
⑧ PISTON ROD SEAL: polyurethane
⑨ GASKET: Klingersil C-4430
⑩ OR SEAL: NBR rubber
⑪ SPRING: C85 steel (for boosters version "M")
⑫ LINER: Ø160 anodized aluminium pipe
Ø100 sectioned anodized aluminium pipe
⑬ PISTON ROD: H&D chromed steel
⑭ PISTON GASKET: rubber (version Ø160)
⑮ PISTON: forged aluminium / rubber (version Ø100)
⑯ PISTON ROD EXTENSION: galvanised steel
⑰ OIL TANK
⑱ SILENCER: nickel-plated brass



COMPONENTS FOR MULTIPLIER 02

① TRF CAP: galvanised steel
② OIL CHAMBER: painted steel
③ BLEED SCREW: galvanised steel
④ SINTERED FILTER: Bronze
⑤ LINER: sectioned and anodized aluminium Ø100
⑥ TIE RODS: galvanised steel
⑦ REAR HEAD: forged aluminium
⑧ BLING NUT: galvanised steel
⑨ PISTON ROD SEAL: polyurethane
⑩ GASKET: Klingersil C-4430
⑪ OR SEAL: NBR rubber
⑫ PISTON ROD SEAL: NR rubber
⑬ PISTON ROD: H&T chromed steel
⑭ PISTON ROD EXTENSION: galvanised steel
⑮ PISTON: rubber
⑯ GASKET OK: NBR rubber
⑰ OIL TANK



KEY TO CODES

Z52	02	100	28	05	P
	SERIES	**BORE**	**PISTON ROD DIAMETER**	**STROKE (cm)**	**RETURN**
	01	100	16 18 20 22	05 08 10 15	**P** (Pneumatic) **M** (Spring-loaded (stroke 05 only)
	02	100	28 32 35	05 10 15 20	**P** (Pneumatic)
	03	160	22 25 32 35	05 07 10 15 20	**P** (Pneumatic) **M** (Spring)

SAMPLE APPLICATIONS

As explained above, the operating principle of pressure multipliers is based on the different surface of the two pistons, so the pressure increases directly in proportion to the area conversion ratio. An example of this concept is explained below.

Let us suppose the first piston has a surface area of 200 cm^2 and pushes a second piston with a surface area of 8 cm^2. The pressure reached by the oil is as follows:

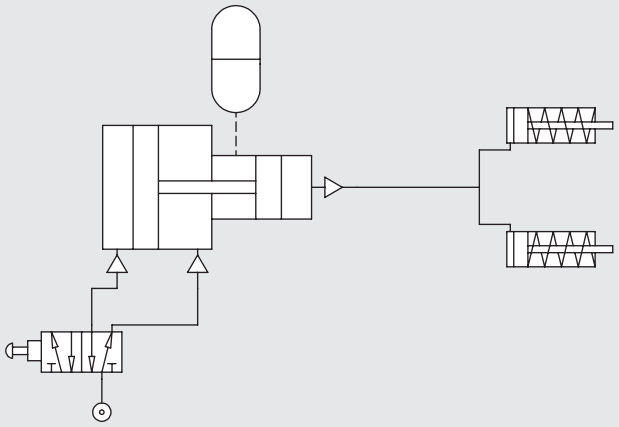
200 cm^2 / 8 cm^2	=	25 x 6 bar (air)	=	150 bar (oil)
Conversion ratio		Input air pressure		Output oil pressure

Therefore a hydraulic cylinder with an inside diameter of 40 mm will generate the following force:

12.56 cm^2	x	150 bar	=	884 kg (1884 daN)
Cylinder area		Oil pressure		Force

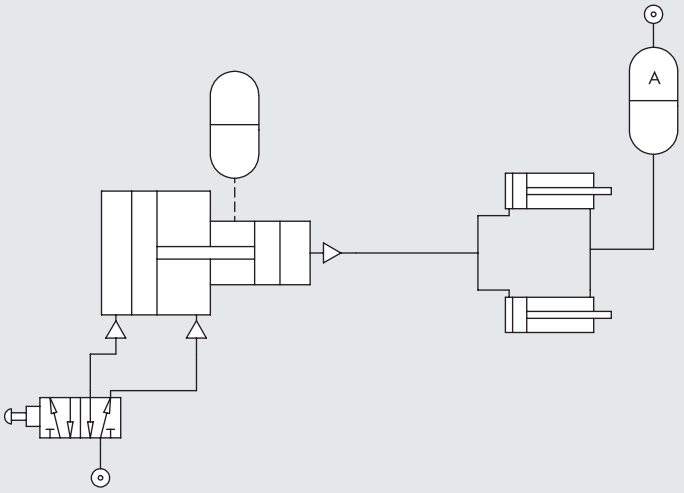
EXAMPLE 1 – Control diagram for single-acting hydraulic cylinders

When a 5/2 valve sends a signal, air enters the multiplier and pushes the first piston. The second piston, which is connected to the first, plunges into an oil chamber, generating a pressure that is converted into a thrust force operating the two connected cylinders.
When the opposite signal is sent, the oil re-enters the chamber, aided by the springs in the cylinder.
Oil in the tank is used to make up for any leaks.



EXAMPLE 2 – Control diagram for dual-acting hydraulic cylinders

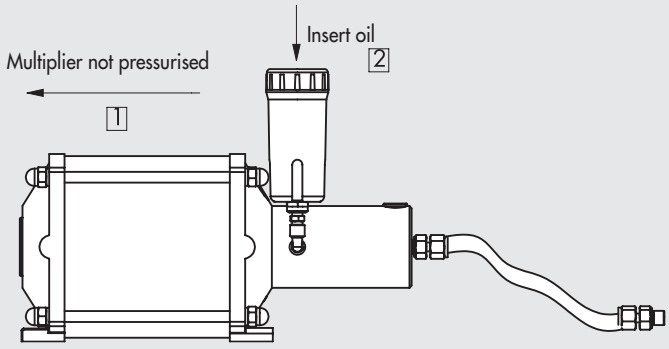
When a 5/2 valve sends a signal, air enters the multiplier and pushes the first piston. The second piston, which is connected to the first, plunges into an oil chamber, generating a pressure that is converted into a thrust force operating the two connected cylinders.
The cylinder return is regulated in this case by the pressure of the air in the compensator A.
Another multiplier can be installed instead of the compensator.



OIL FILLING METHODS

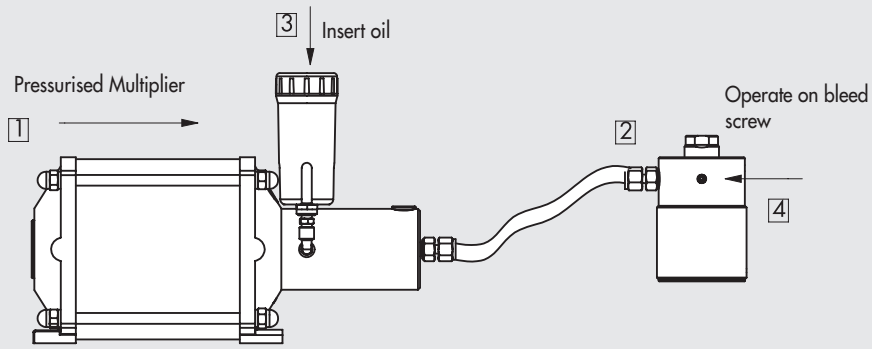
When designing the hydraulic circuit, it is necessary to take an important operation into consideration.
The oil tank must be positioned at the highest point of the circuit so that excess air can be released and the pressure maintained without any residual air.

METHOD 1 – Multiplier not pressurised



Connect the high-pressure pipe to the multiplier outlet.
Do not pressurize the surface, leaving the piston in the home position (1)
Fill the recovery tank (2) with oil until it starts to come out of the pipe.
The circuit is now full of oil, so connect the cylinder to the end of the pipe.

METHOD 2 – Multiplier pressurised



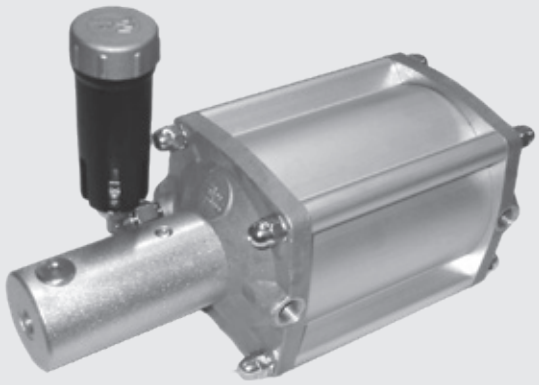
Connect one end of the high-pressure pipe to the multiplier outlet.
Pressurise the multiplier, WITHOUT FILLING WITH OIL (1).
Connect the other end of the pipe to the cylinder (2) and fill the tank (3) with oil.
Depressurise the multiplier you can see the oil in the tank returning to the steel chamber.
Unscrew the cylinder lead screw (4) slightly and feed LOW pressure air into the multiplier.
Oil will start to come out of the hole in the cylinder after a few cycles. Close the valve.

N.B. Do not unscrew the bleed screw completely as you would lose control of the oil.

SERIES 01 - AIR/OIL PRESSURE MULTIPLIERS
BARREL DIAMETER 100 mm

Available in 20 standard models:
- 4 with spring-loaded return
- 16 with pneumatic return

On request it is possible also to run some special applications, such as in cases where you need a higher multiplication ratio or dimensions in drawing.
Multipliers can be ordered also without oil tank or with a larger tank.
We can also add surface treatments on the internal and external parts in case you use multipliers in particular environments or in contact with corrosive substances.
See the section "Special Articles".

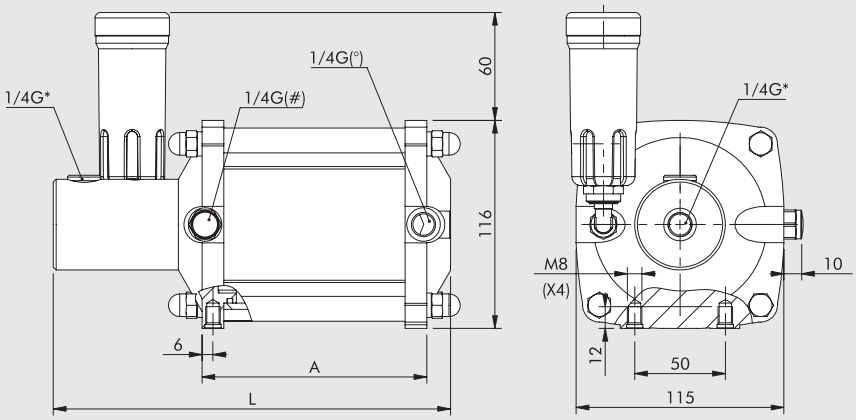


DIMENSIONS

* = Oil flow:
Possible top and/or front connection

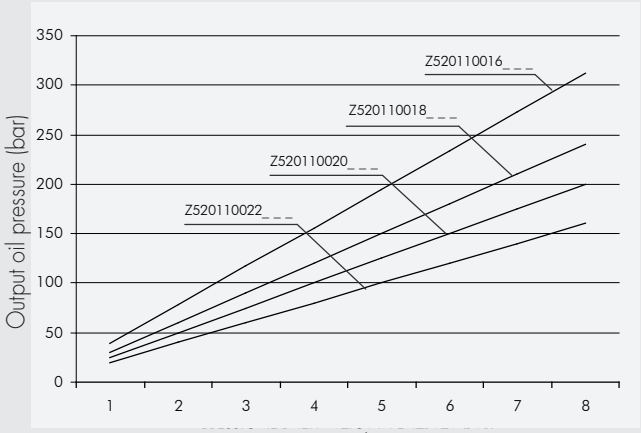
(#) = With pneumatic return: air
With spring-loaded return: silencer mounted

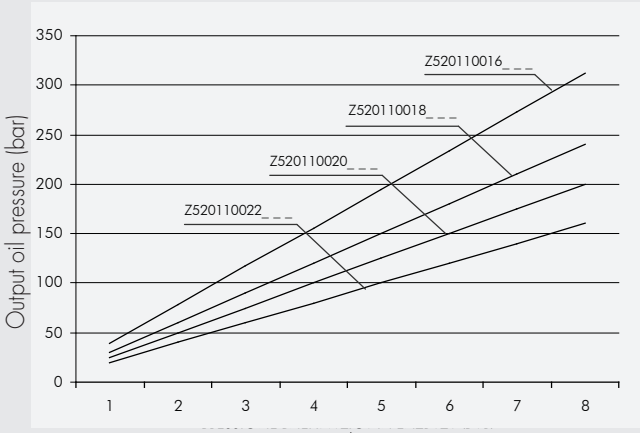
(o) = Air supply



Code	Pressure ratio	Oil with air at: 5 bar	Oil with air at: 8 bar	Oil Volume [cm³]	Air Volume [cm³]	A	L
Z52011001605M	39:1	195	312	11	390	124	220
Z52011001605P	39:1	195	312	11	390	124	220
Z52011001608P	39:1	195	312	16	628	154	280
Z52011001610P	39:1	195	312	20	785	174	320
Z52011001615P	39:1	195	312	30	1178	224	420
Z52011001805M	30:1	150	240	13	390	124	220
Z52011001805P	30:1	150	240	13	390	124	220
Z52011001808P	30:1	150	240	20	628	154	280
Z52011001810P	30:1	150	240	25	785	174	320
Z52011001815P	30:1	150	240	38	1178	224	420
Z52011002005M	25:1	125	200	16	390	124	220
Z52011002005P	25:1	125	200	16	390	124	220
Z52011002008P	25:1	125	200	25	628	154	280
Z52011002010P	25:1	125	200	31	785	174	320
Z52011002015P	25:1	125	200	47	1178	224	420
Z52011002205M	20:1	100	160	19	390	124	220
Z52011002205P	20:1	100	160	19	390	124	220
Z52011002208P	20:1	100	160	30	628	154	280
Z52011002210P	20:1	100	160	38	785	174	320
Z52011002215P	20:1	100	160	57	1178	224	420

AIR PRESSURE / OIL PRESSURE DIAGRAM

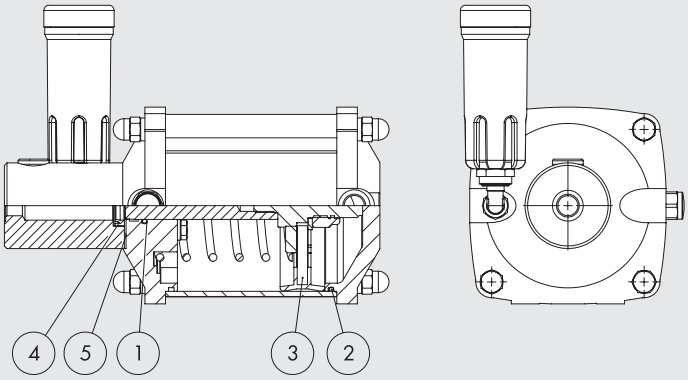




SPRING-RETURN MULTIPLIER GASKETS KIT

Code	Bore	Refer
Z5201K_ _M	16 ÷ 22	①②③④⑤

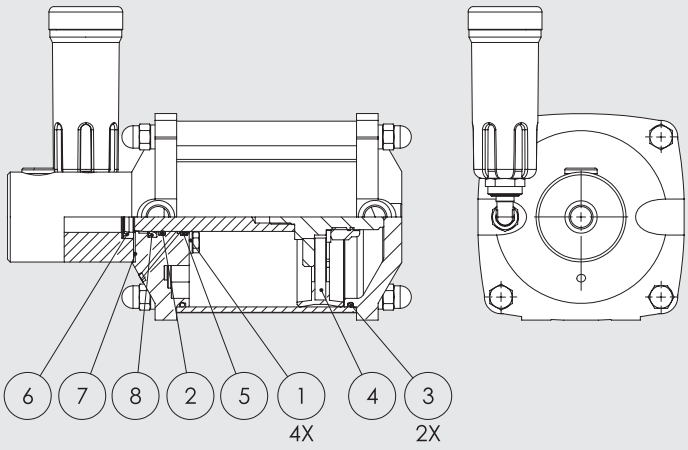
_ _ = Diameter of multiplier rod



PNEUMATIC-RETURN MULTIPLIER GASKETS KIT

Code	Bore	Refer
Z5201K_ _P	16 ÷ 22	①②③④⑤⑥⑦⑧

_ _ = Diameter of multiplier rod



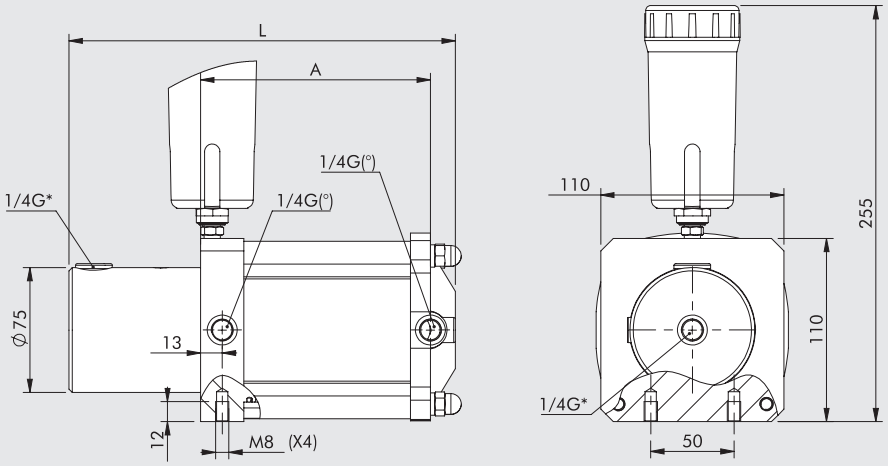
SERIES 02 - AIR/OIL PRESSURE MULTIPLIERS
BARREL DIAMETER 100 mm

Available in 12 standard models:
12 with pneumatic return

On request it is also possible to run some special applications, such as in cases where you need to have a higher multiplication ratio or dimensions in drawing.
Multipliers can be ordered also without oil tank or with a larger tank.
We can also add surface treatments on the internal and external parts in case you use multipliers in particular environments or in contact with corrosive substances.
See the section "Special Articles".

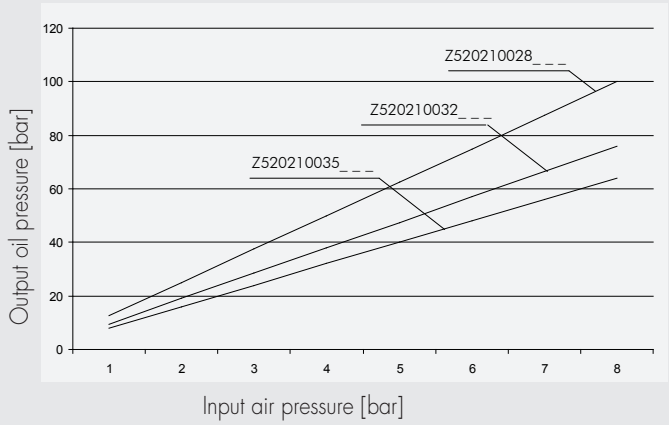
DIMENSIONS

* = Oil flow:
Possible top and/or front connection
(o) = Air supply



Code	Pressure ratio	Oil with air at: 5 bar	Oil with air at: 8 bar	Oil Volume [cm³]	Air Volume [cm³]	A	L
Z52021002805P	12,5:1	62	100	31	390	138	230
Z52021002810P	12,5:1	62	100	61	785	188	330
Z52021002815P	12,5:1	62	100	91	1180	238	430
Z52021002820P	12,5:1	62	100	123	1570	288	530
Z52021003205P	9,5:1	47	76	40	390	138	230
Z52021003210P	9,5:1	47	76	80	785	188	330
Z52021003215P	9,5:1	47	76	120	1180	238	430
Z52021003220P	9,5:1	47	76	160	1570	288	530
Z52021003505P	8:1	40	64	48	390	138	230
Z52021003510P	8:1	40	64	96	785	188	330
Z52021003515P	8:1	40	64	144	1180	238	430
Z52021003520P	8:1	40	64	191	1570	288	530

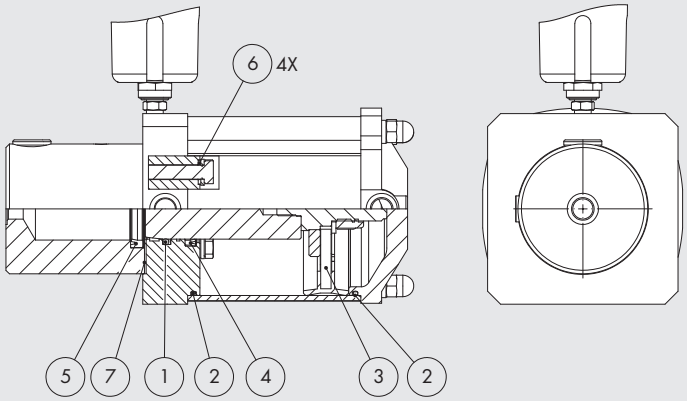
AIR PRESSURE / OIL PRESSURE DIAGRAM



GASKETS KIT

Code	Bore	Refer
Z5202K_ _P	16 ÷ 22	① ② ③ ④ ⑤ ⑥ ⑦ ⑧

_ _ = Diameter of multiplier rod

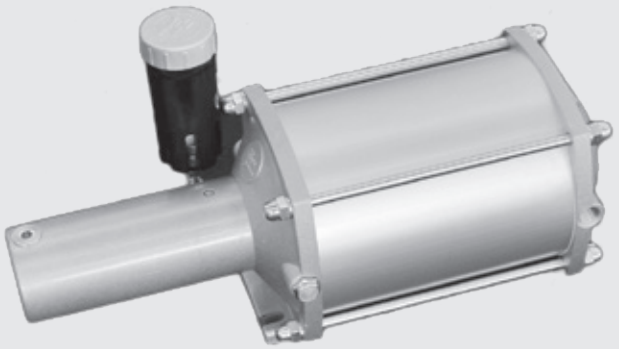


NOTES

SERIES 03 - AIR/OIL PRESSURE MULTIPLIERS
BARREL DIAMETER 160 mm
SPRING RETURN / PNEUMATIC RETURN

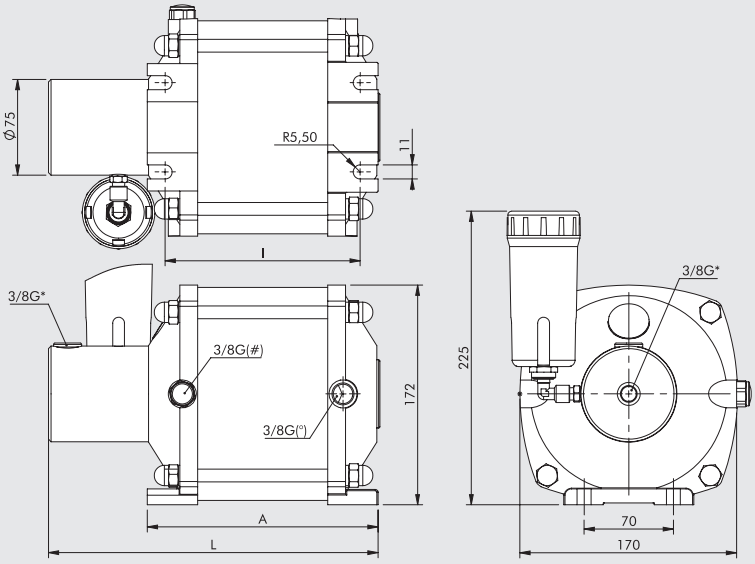
Available in 36 standard models:
16 with spring-loaded return
20 with pneumatic return
Special constructions on request

On request it's possible also to run some special applications, such as in cases where you need to have a higher multiplication ratio or dimensions in drawing.
Multipliers can be ordered also without oil tank or with a larger tank.
We can also add surface treatments on the internal and external parts in case you use multipliers in particular environments or in contact with corrosive substances.
See the section "Special Articles".



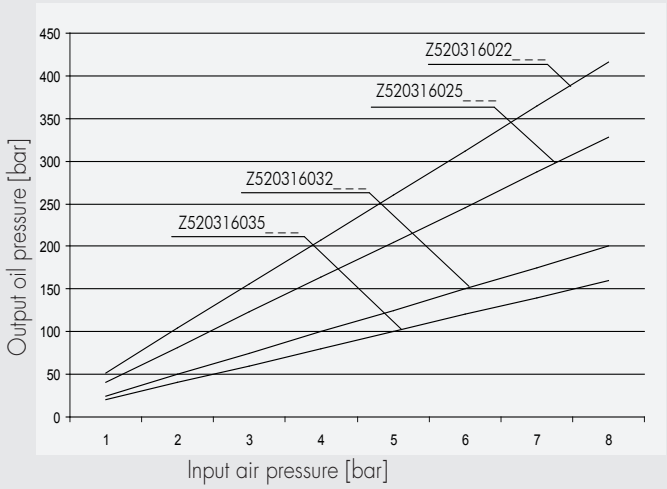
DIMENSIONS

* = Oil flow:
Possible top and/or front connection
(#) = With pneumatic return: air
With spring-loaded return: silencer mounted
(o) = Air supply



Code	Pressure ratio	Oil with air at: 5 bar	Oil with air at: 8 bar	Oil Volume [cm³]	Air Volume [cm³]	I	A	L
Z52031602205M/P	52:1	260	416	19	1005	165	180	260
Z52031602207M/P	52:1	260	416	26	1405	185	200	300
Z52031602210M/P	52:1	260	416	38	2009	215	230	360
Z52031602215M/P	52:1	260	416	57	3015	265	280	460
Z52031602220P	52:1	260	416	75	4015	311	340	680
Z52031602505M/P	41:1	205	328	24	1005	165	180	260
Z52031602507M/P	41:1	205	328	34	1405	185	200	300
Z52031602510M/P	41:1	205	328	49	2009	215	230	360
Z52031602515M/P	41:1	205	328	73	3015	265	280	460
Z52031602520P	41:1	205	328	98	4015	311	340	680
Z52031603205M/P	25:1	125	200	40	1005	165	180	260
Z52031603207M/P	25:1	125	200	56	1405	185	200	300
Z52031603210M/P	25:1	125	200	76	2009	215	230	360
Z52031603215M/P	25:1	125	200	116	3015	265	280	460
Z52031603220P	25:1	125	200	160	4015	311	340	680
Z52031603505M/P	20:1	105	168	48	1005	165	180	260
Z52031603507M/P	20:1	105	168	67	1405	185	200	300
Z52031603510M/P	20:1	105	168	96	2009	215	230	360
Z52031603515M/P	20:1	105	168	144	3015	265	280	460
Z52031603520P	20:1	105	168	190	4015	311	340	680

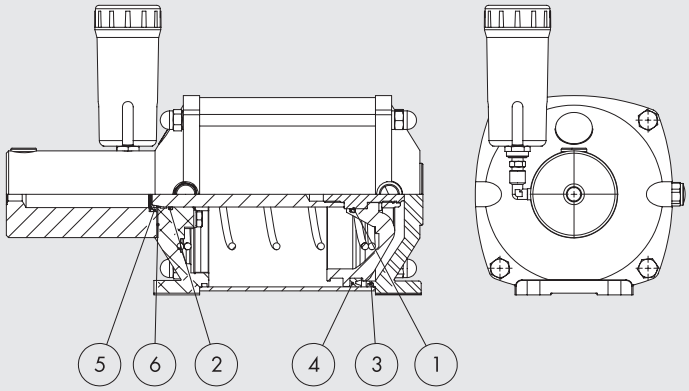
AIR PRESSURE / OIL PRESSURE DIAGRAM



SPRING-RETURN MULTIPLIER GASKETS KIT

Code	Bore	Refer
Z5203K_ _00M	22-25-32-35	① ② ③ ④ ⑤ ⑥

_ _ = Diameter of multiplier rod



PNEUMATIC-RETURN MULTIPLIER GASKETS KIT

Code	Bore	Refer
Z5203K_ _00P	22-25-32-35	① ② ③ ④ ⑤ ⑥ ⑦ ⑧

_ _ = Diameter of multiplier rod