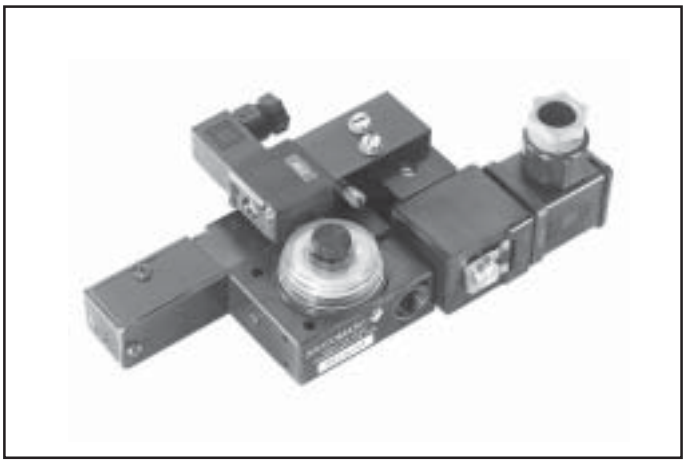
MODULAR VACUUM GENERATOR
WITH VENTURI EFFECT
TWO-STAGE NOZZLE

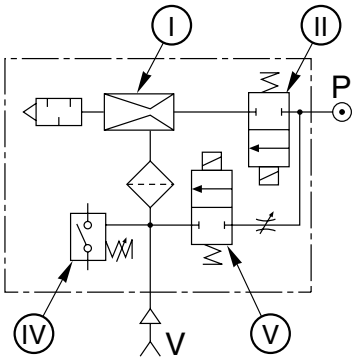
GENERAL

This generator allows higher exhaust volumes and is recommended for large size operating systems with :
- large diameter suction cups,
- extensive number of suction cups,
- extra long piping.

This product is available in 2 versions depending on the diameter of the nozzle (Ø1 and Ø1.6 mm).



WORKING PRINCIPLE (diagram)



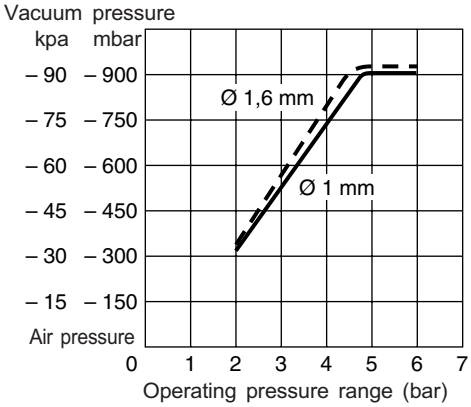
(I) Standard model with exhaust muffler and vacuum filter
(II) Pump solenoid valve
(IV) Adjustable vacuum switch
(V) Solenoid breaking valve

SPECIFICATIONS

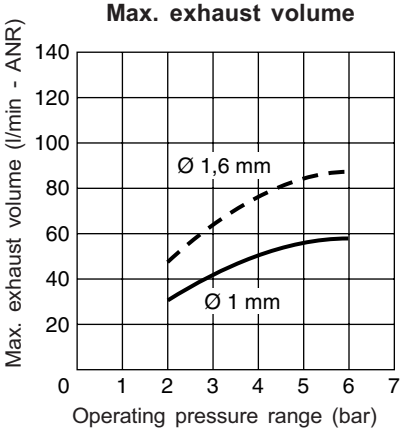
FLUID	:	Compressed air, filtered 5 to 20 µm, dry, non lubricated.
OPERATING PRESSURE RANGE	:	2 to 6 bar.
ULTIMATE VACUUM PRESSURE	:	– 920 mbar (92 % vacuum) obtained from 5 bar.
CONNECTION :		
- PRESSURE ADMISSION	:	G 1/8.
- EMPTY CIRCUIT	:	G 1/4.
TEMPERATURE AMBIENT	:	0°C, + 55°C.
NOZZLE DIAMETER	:	1 - 1.6 mm.
MAX. EXHAUST VOLUME (AT 5 BAR)	:	50 l/min - ANR (with Ø 1). 80 l/min - ANR (with Ø 1.6).
AIR CONSUMPTION	:	See diagram below.
VOLTAGE	:	24 V DC (other voltages, on request)

CHARACTERISTICS OF THE TWO-STAGE VACUUM GENERATOR

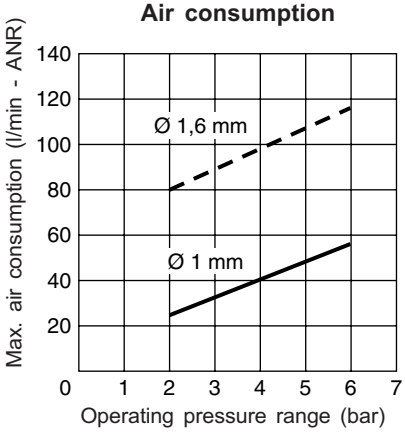
Vacuum pressure range



Max. exhaust volume



Air consumption



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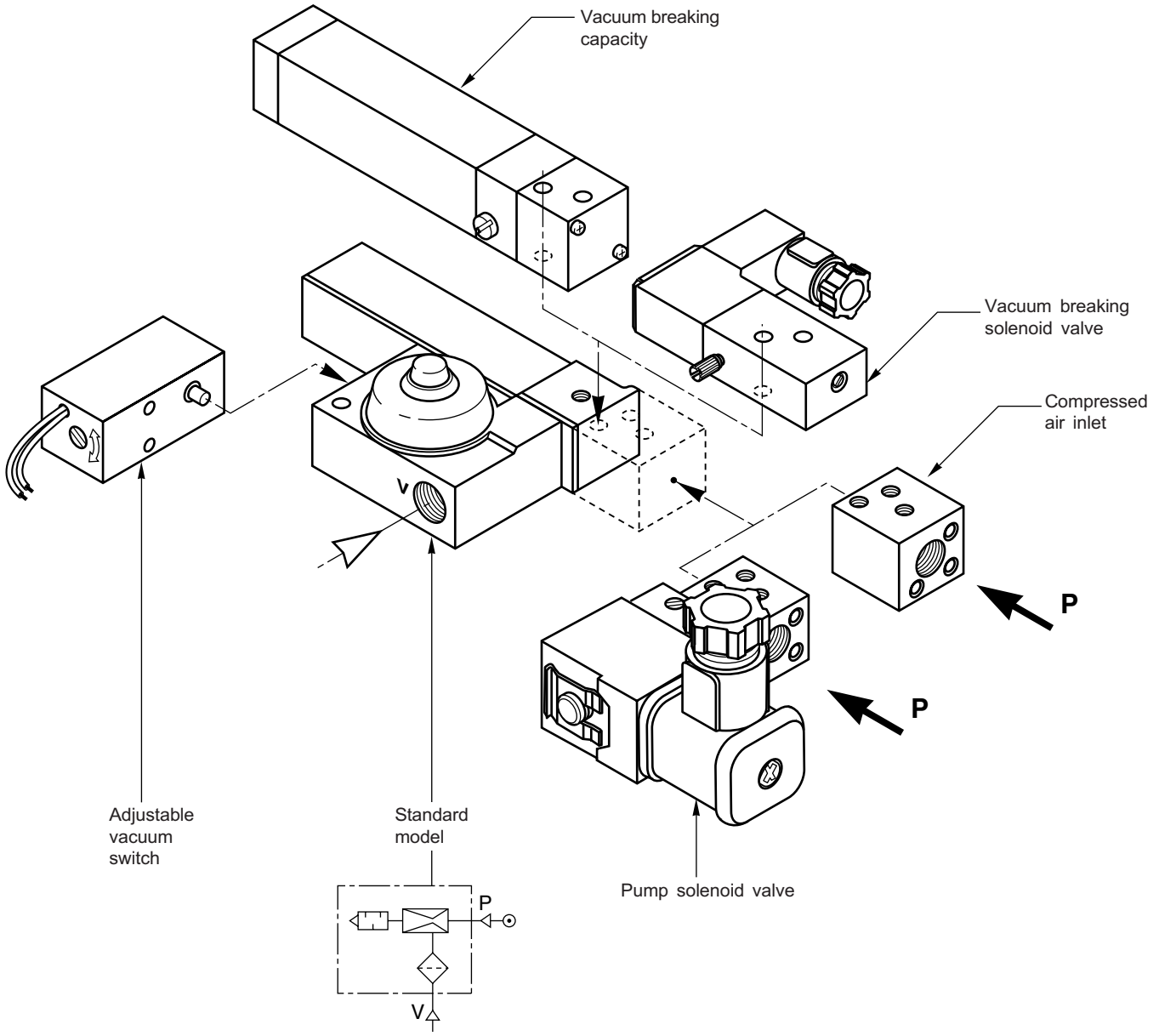
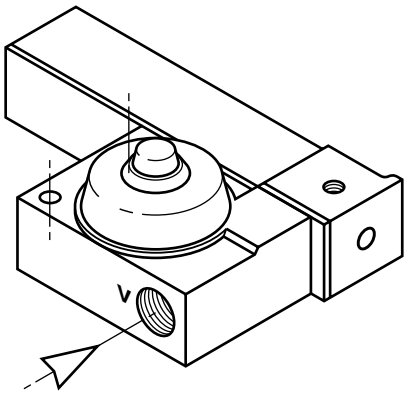
ASSEMBLY

Due to its modular construction, the two-stage vacuum generator is designed to meet the needs of automated handling and transfer systems : the standard model can be fitted with various complementary functional elements.

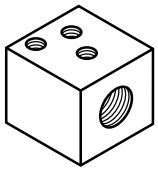


STANDARD MODEL



The standard model includes 2 in-line venturi nozzles, a built-in exhaust muffler and a vacuum filter (30 µm).
Two versions are available : nozzle Ø 1 mm ; Ø 1.6 mm for a greater maximum exhaust volume.
Mounting of vacuum generator by means of 2 fitting holes for screws Ø 4 mm.
Vacuum connection : G 1/4.

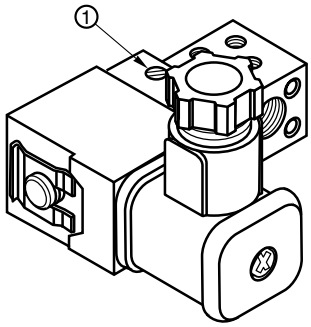
COMPRESSED AIR INLET



The inlet is fitted to the standard model, and allows compressed air into the vacuum generator.

- Connection : G 1/8.
- Weight : 33 g
- Code : **881 36 706**

PUMP SOLENOID VALVE

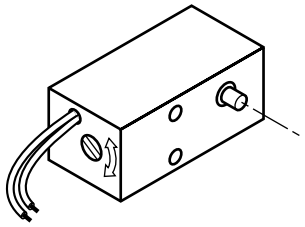


This solenoid valve is fitted to the standard model, and allows compressed air into the vacuum generator.

- Solenoid valve 2/2 NC
- Connection : G 1/8
- Serviceable voltage : 24 V DC (other voltages on request)
- Electrical consumption : 5 W
- Electrical connection : by connector size 30, ISO 4400 rotatable x 90° - CM10 (Pg 11P)
- Manual override screwdriver (1)
- Weight : 190 g
- Code of solenoid valve with coil : **881 36 713**
- Spare coil, class F : **430 04 647** (24 V DC)

ADJUSTABLE VACUUM SWITCH

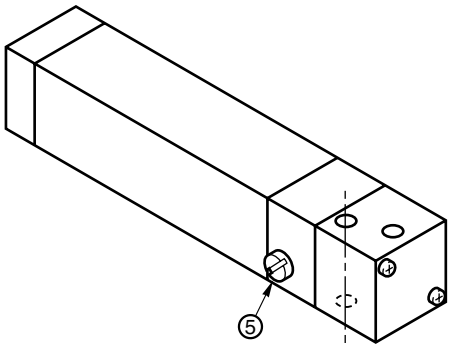
The vacuum switch is used to check the presence of vacuum. LED indication is provided.



- Vacuum switch adjustable range : – 260 to – 800 mbar
- Max. operating voltage : 100 V AC – 24 V DC
- Max. intensity : 10 mA (AC) – 30 mA (DC)
- Electrical connection : output by 2 wires 0.15 m long
- Weight : 37 g
- Code of adjustable vacuum switch : **881 36 712**
- Preset pressure of vacuum switch : – 650 mbar

VACUUM BREAKING VALVE WITH AIR CAPACITY

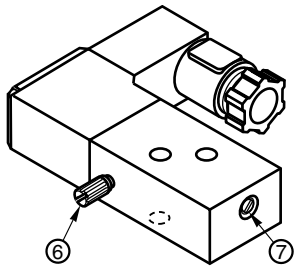
The vacuum breaking valve allows better cycle rates by reducing the time needed to release the workpiece. This system starts as soon as an automatic mini shuttle valve interrupts pressure supply and releases compressed air from the reservoir. It "breaks vacuum" and allows faster release of the workpiece.



- A buit-in mini flow reducer (5) is used to adjust the release time when several generators and cups are used on the same workpiece.
- Capacity volume : 30 cm^3
- Operating pressure : 4 - 6 bar
- Weight : 130 g
- Code of the capacity : **881 36 708**

VACUUM BREAKING VALVE SOLENOID TYPE

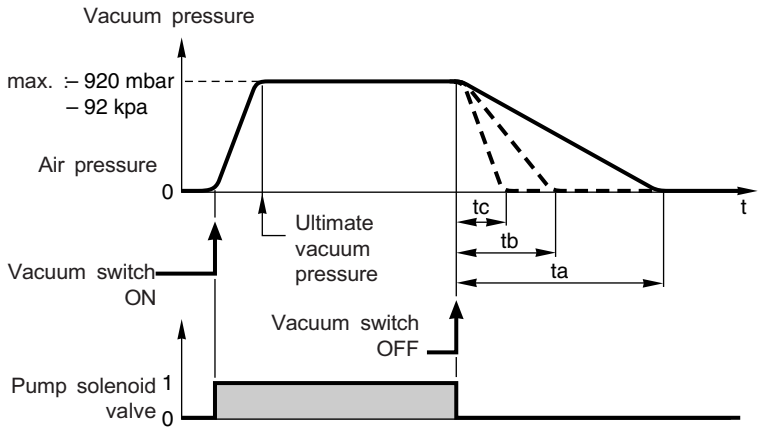
The solenoid valve allows fast release of the workpiece. It is particularly recommended for high-speed cycle rates. A built-in mini flow reducer (7) allows adjustment of the release time.



- Solenoid valve 2/2 NC
- Integrated pneumatic connection
- Serviceable voltage : 24 V DC
- Electrical consumption : 1,6 W
- Electrical connection : by connector size 15, rotatable x 90° - CM6 (Pg 7P)
- Latchable manual override (6)
- Weight : 100 g
- Code of the vacuum breaking valve, solenoid type : **881 36 709**

HOW TO MEASURE VACUUM REACHING / BREAKING TIME

Vacuum can be reached or broken by switching ON / OFF the pump solenoid valve.



Vacuum breaking valve response time

Time needed to release the workpiece depends on vacuum breaking valve response time.

ta : Time needed when using the standard model of vacuum generator **A** ; time needed depends on various parious parameters (vacuum equipment size in particular).

The vacuum breaking valve allows faster release of the piece :

tb : Time needed when using a vacuum breaking valve with air capacity **B**

tc : Time needed when using a solenoid type vacuum breaking valve **C**

Times tb and tc are adjustable.

CHOICE OF EQUIPMENT

The two-stage modular vacuum generator can be fitted with several adjustable accessories. These products are **delivered completely assembled** (see options and codes overleaf and following pages).

Options are defined in the diagram below.

		Pneumatic control		Electro pneumatic control	
		WITHOUT switch	WITH switch	WITHOUT switch	WITH switch
Standard model **A**		A1	A2	A3	A4
with vacuum breaking valve	With air capacity **B**	B1	B2	B3	B4
	Solenoid type **C**	–	–	C3	C4

The diagrams below show vacuum variations inside the three main versions (**A** **B** **C**) of the modular two-stage vacuum generator when the pump solenoid valve is switched ON and OFF.

A - STANDARD MODEL (including the pump solenoid valve and vacuum switch)

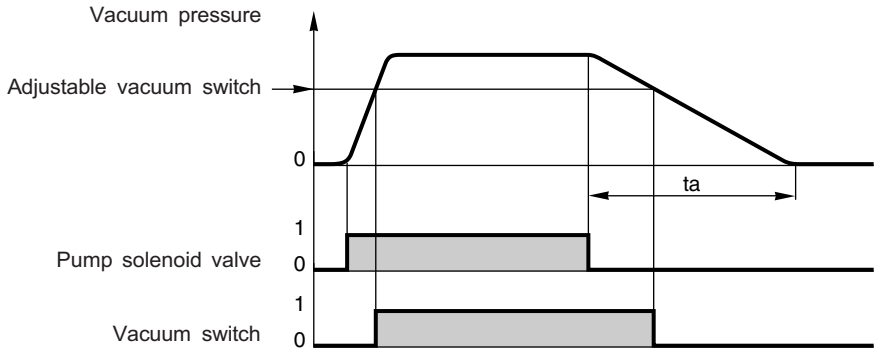
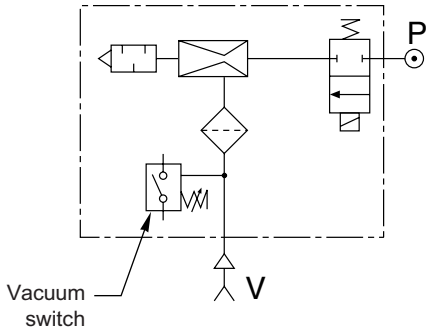


DIAGRAM OF THE VACUUM GENERATOR



B - VACUUM BREAKING VALVE WITH AIR CAPACITY

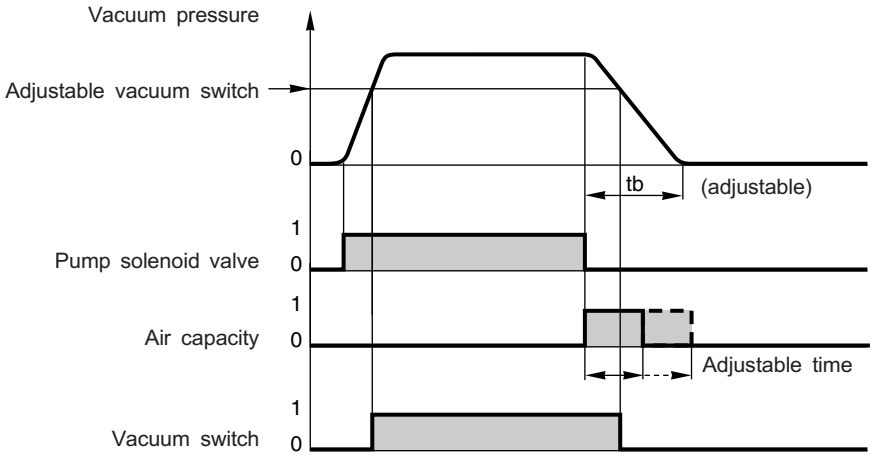
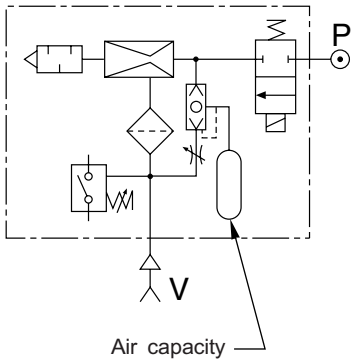


DIAGRAM OF THE VACUUM GENERATOR



C - SOLENOID TYPE VACUUM BREAKING VALVE

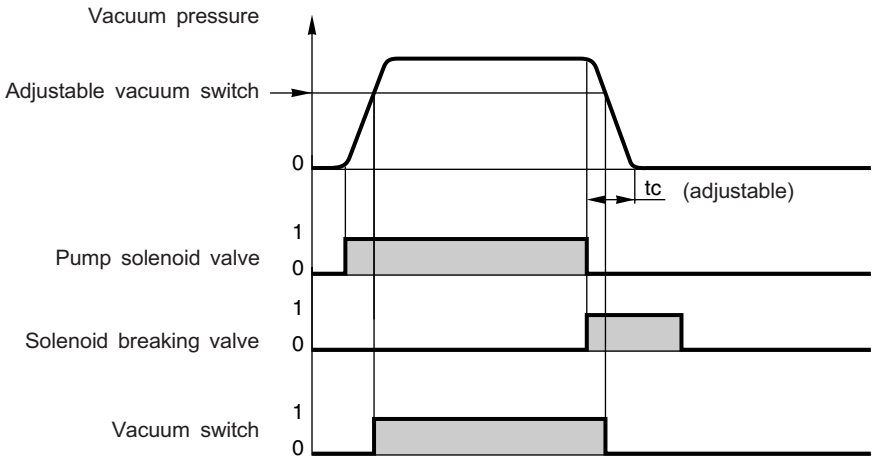
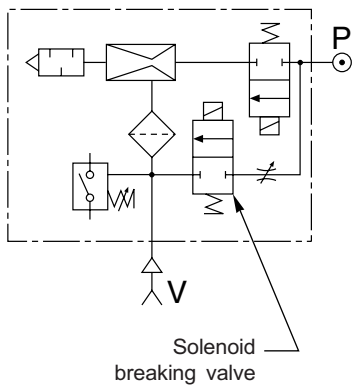


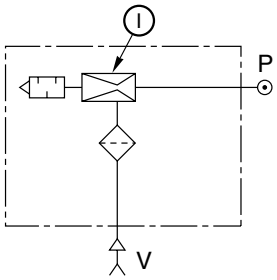
DIAGRAM OF THE VACUUM GENERATOR



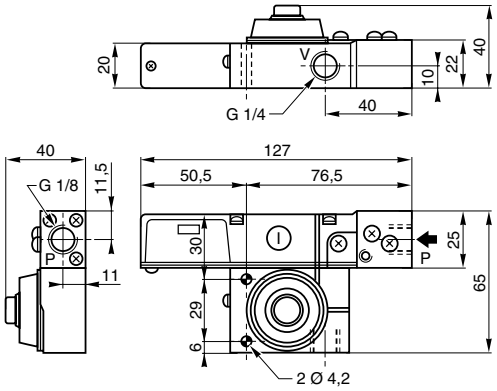
A TWO-STAGE VACUUM GENERATOR - STANDARD MODELS

(A1) - AIR OPERATED

This generator generates a vacuum by means of a pump solenoid valve.



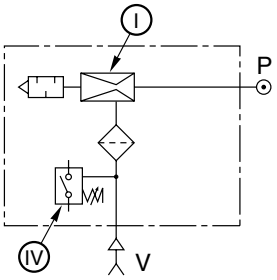
Weight : 0.175 kg



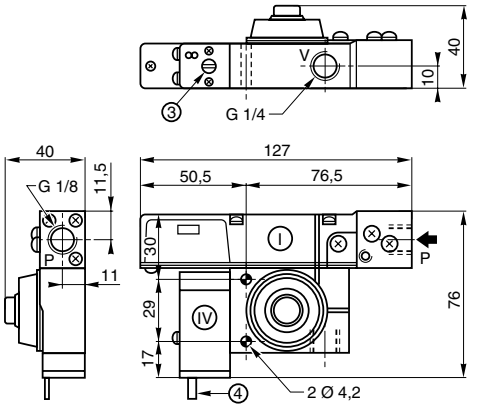
Description	Ø nozzles (mm)	CODES
Two-stage vacuum generator air operated	1	**367 00 013**
	1.6	**367 00 014**

(A2) - AIR OPERATED + VACUUM SWITCH

Same vacuum generator as above + a control vacuum switch and LED indication of the vacuum pressure.



Weight : 0.207 kg

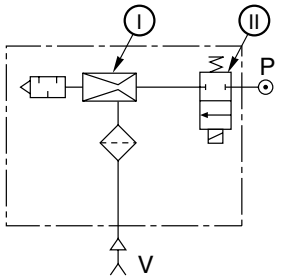


Description	Ø nozzles (mm)	CODES
Two-stage vacuum generator air operated with vacuum switch	1	**367 00 021**
	1.6	**367 00 022**

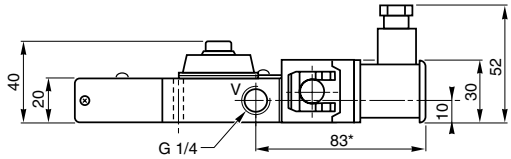
(I) Standard model with exhaust muffler and vacuum filter
(IV) Adjustable vacuum switch
(3) Adjustable vacuum switch
(4) Electrical connection : 2 wires 0.40 mm², 0.15 m long

(A3) - ELECTRO PNEUMATIC CONTROL

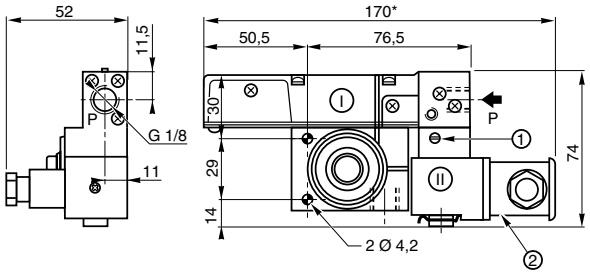
This vacuum generator generates a vacuum by switching ON the pump solenoid valve.



Weight : 0.356 kg

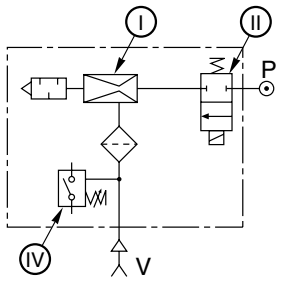


Description	Ø nozzles (mm)	CODES
Two-stage vacuum generator electro pneumatic control	1	**367 00 015**
	1.6	**367 00 018**

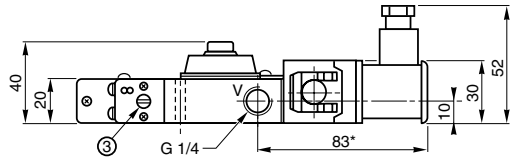


(A4) - ELECTRO PNEUMATIC CONTROL + VACUUM SWITCH

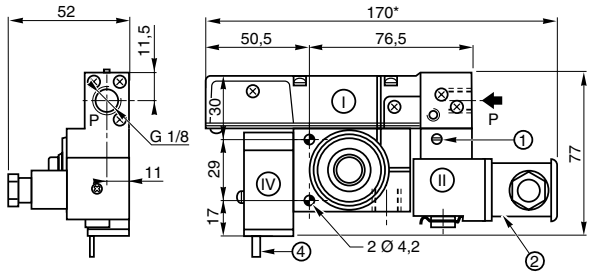
Same vacuum generator as above + a control vacuum switch and LED indication of the vacuum pressure.



Weight : 0.388 kg



Description	Ø nozzles (mm)	CODES
Two-stage vacuum generator electro pneumatic control with vacuum switch	1	**367 00 027**
	1.6	**367 00 030**



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(I) Standard model with exhaust muffler and vacuum filter
(II) Pump solenoid valve (24 V DC) other voltage, on request
(IV) Adjustable vacuum switch

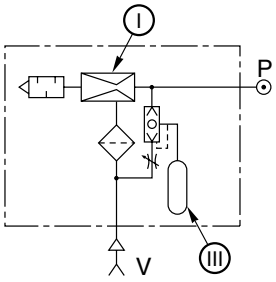
① Screwdriver manual override on pump solenoid valve
② Electrical connection by connector size 30
ISO 4400, rotatable x 90° - CM10 (Pg 11P)
option : connector with cable 2 m long, code **881 22 612**
③ Adjustable vacuum switch
④ Electrical connection : 2 wires 0.40 mm², 0.15 m long

✶ + 15 mm for connector clearance

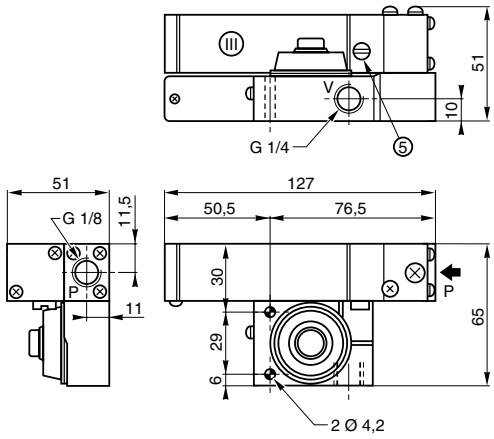
B TWO-STAGE VACUUM GENERATOR WITH VACUUM BREAKING VALVE, AIR CAPACITY TYPE

(B1) - AIR OPERATED

This generator creates a vacuum by means of a pump solenoid valve. Upon switching it OFF, the vacuum breaking valve with air capacity "breaks the vacuum" to allow faster release of the workpiece.



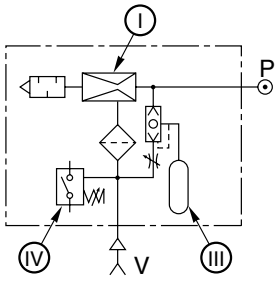
Weight : 0.300 kg



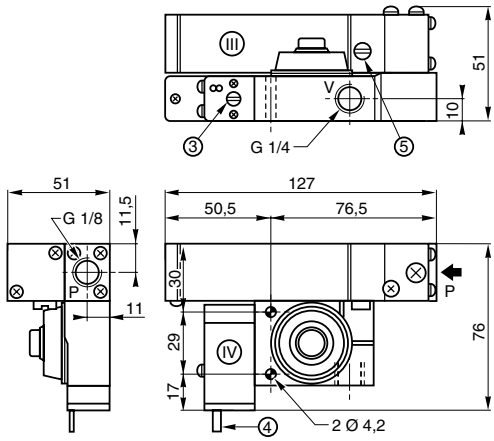
Description	Ø nozzles (mm)	CODES
Two-stage vacuum generator air operated with vacuum breaking valve, air capacity type	1	**367 00 023**
	1.6	**367 00 024**

(B2) - AIR OPERATED + VACUUM SWITCH

Same vacuum generator as above + a control vacuum switch and LED indication of the vacuum pressure.



Weight : 0.332 kg

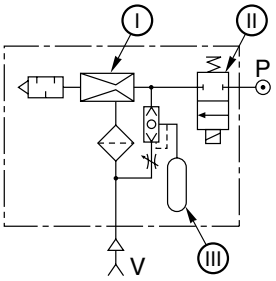


Description	Ø nozzles (mm)	CODES
Two-stage vacuum generator air operated with vacuum breaking valve, air capacity type + vacuum switch	1	**367 00 025**
	1.6	**367 00 026**

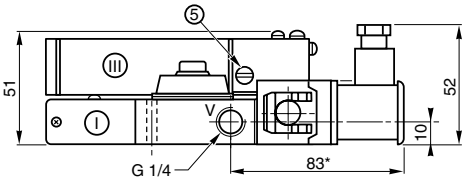
(I) Standard model with exhaust muffler and vacuum filter
(III) Vacuum breaking valve with air capacity
(IV) Adjustable vacuum switch
(3) Adjustable vacuum switch
(4) Electrical connection : 2 wires Ø 0.40 mm², 0.15 m long
(5) Adustable air capacity

(B3) - ELECTRO PNEUMATIC CONTROL

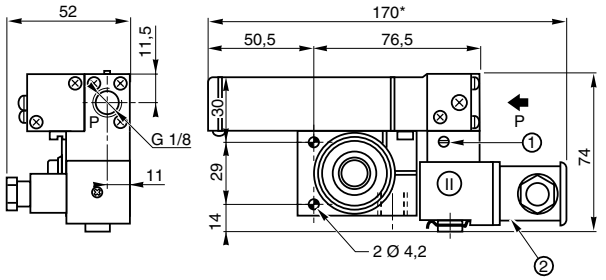
This generator generates a vacuum by means of a pump solenoid valve. Upon switching it OFF, the air capacity of the vacuum breaking valve "breaks the vacuum" to allow faster release of the workpiece.



Weight : 0.487 kg

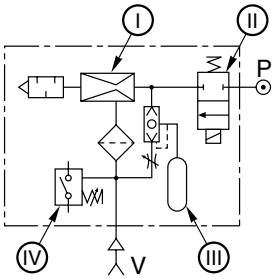


Description	Ø nozzles (mm)	CODES
Two-stage vacuum generator electro pneumatic control + vacuum breaking valve with air capacity	1	**367 00 033**
	1.6	**367 00 036**

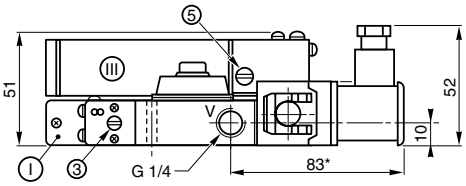


(B4) - ELECTRO PNEUMATIC CONTROL + VACUUM SWITCH

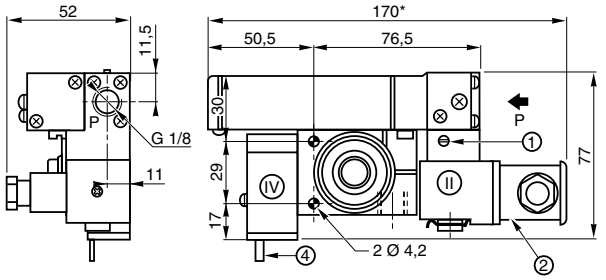
Same vacuum generator as above + a control vacuum switch and LED indication of the vacuum pressure.



Weight : 0.520 kg



Description	Ø nozzles (mm)	CODES
Two-stage vacuum generator electro pneumatic control + vacuum breaking valve with air capacity + vacuum switch	1	**367 00 039**
	1.6	**367 00 042**



Ⓘ Standard model with exhaust muffler and vacuum filter
ⅡⅡ Pump solenoid valve (24 V DC) other voltage, on request
ⅢⅢ Vacuum breaking valve with air capacity
ⅣⅣ Adjustable vacuum switch

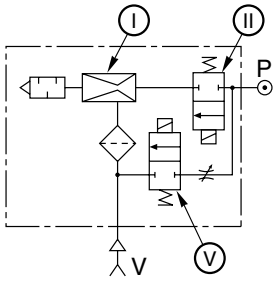
∗ + 15 mm for connector clearance

① Screwdriver manual override on pump solenoid valve
② Electrical connection by connector size 30 ISO 4400, rotatable x 90° - CM10 (Pg 11P)
option : connector with cable 2 m long, code **881 22 612**
③ Adjustable vacuum switch
④ Electrical connection : 2 wires 0.40 mm², 0.15 mlong
⑤ Adjustable air capacity

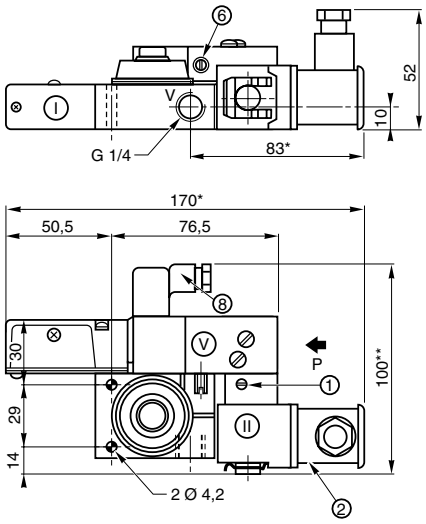
C VACUUM GENERATOR WITH VACUUM BREAKING VALVE, SOLENOID TYPE

C3 - ELECTRO PNEUMATIC CONTROL

This vacuum generator generates vacuum by means of the pump solenoid valve (II). Upon switching it OFF (II), and switching ON the solenoid valve (V), the vacuum breaking valve immediately achieves the release of the workpiece.



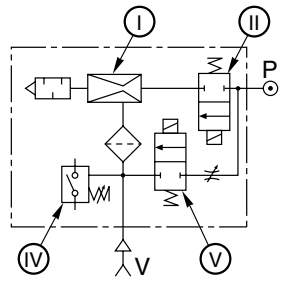
Weight : 0.460 kg



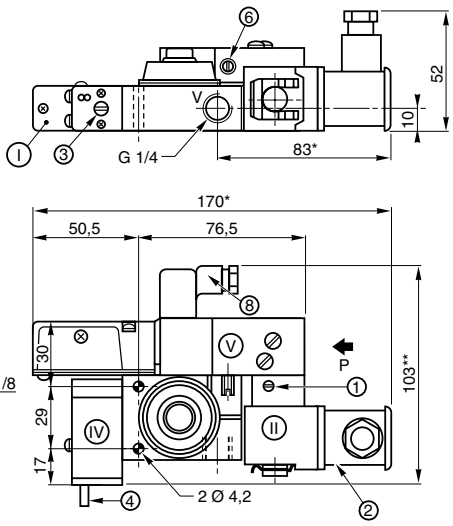
Description	Ø nozzles (mm)	CODES
Two-stage vacuum generator electro pneumatic control with vacuum breaking valve, solenoid type	1	**367 00 045**
	1.6	**367 00 048**

C4 - ELECTRO PNEUMATIC CONTROL + VACUUM SWITCH

Same vacuum generator as above + a control vacuum switch and LED indication of the vacuum pressure.



Weight : 0.490 kg



Description	Ø nozzles (mm)	CODES
Two-stage vacuum generator electro pneumatic control with vacuum breaking valve, solenoid type + vacuum switch	1	**367 00 051**
	1.6	**367 00 054**

(I) Standard model with exhaust muffler and vacuum filter
(II) Pump solenoid valve (24 V DC) other voltage, on request
(IV) Adjustable vacuum switch
(V) Vacuum breaking valve with solenoid (24 V DC)

∗ + 15 mm for connector clearance
∗∗ + 10 mm for connector clearance

① Screwdriver manual override on pump solenoid valve
② Electrical connection by connector size 30 ISO 4400, rotatable x 90° - CM10 (Pg 11 P)
option : connector with cable 2 m long, code **881 22 612**
③ Adjustable vacuum switch
④ Electrical connection : 2 wires 0.40 mm², 0.15 m long
⑥ Manual override with knurled button on vacuum breaking valve solenoid
⑦ Adjustable air capacity
⑧ Electrical connection by connector size 15, rotatable x 90° CM6 (Pg 7P)
option : connector with cable 2 m long, code **881 43 567**

VACUUM MAINTAINING VALVE FOR TWO-STAGE VACUUM GENERATOR

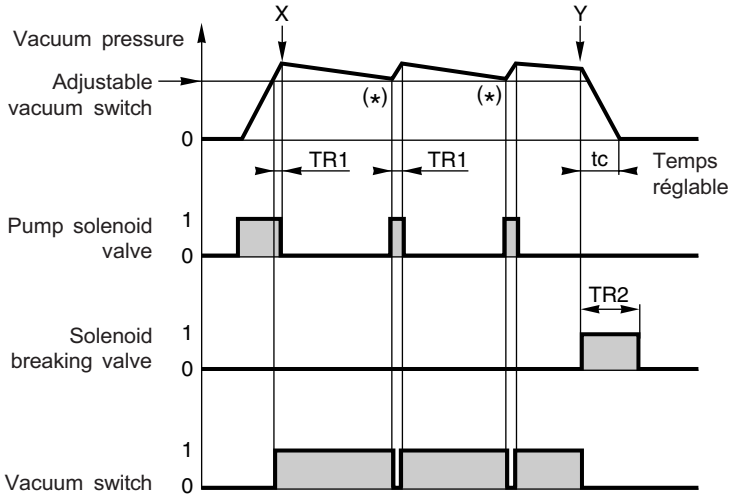
FUNCTION : Energy saving

If indexing is extended and the suction cup lifts the workpiece very well, the use of a vacuum maintaining valve will minimize consumption of compressed air by switching OFF the pump solenoid valve as soon as the required level of vacuum is reached. This non-return valve maintains vacuum, even when electrical supply is cut OFF.

This system fits on a two-stage vacuum generator equipped with a vacuum switch and a vacuum breaking valve solenoid type in order to release the workpiece at the end of transfer.

If vacuum decreases due to leakage during transfer, the vacuum switch goes OFF. The automatic system (to be assembled) switches ON the pump solenoid valve to start vacuum again.

Graph of vacuum pressure for the transfer of workpieces from position X to position Y



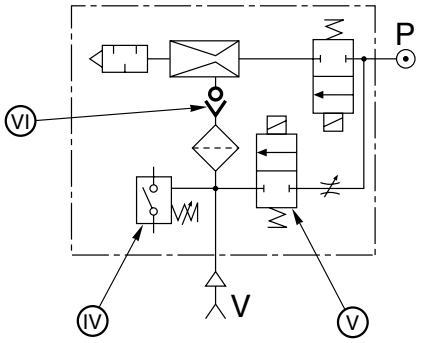
(*) : Detected leaks

TR1 : Time needed to allow maximum vacuum pressure.

TR2 : Time needed to switch ON the vacuum breaking solenoid valve

tc : Adjustable time of release on the vacuum breaking valve solenoid.

Diagram of the generator

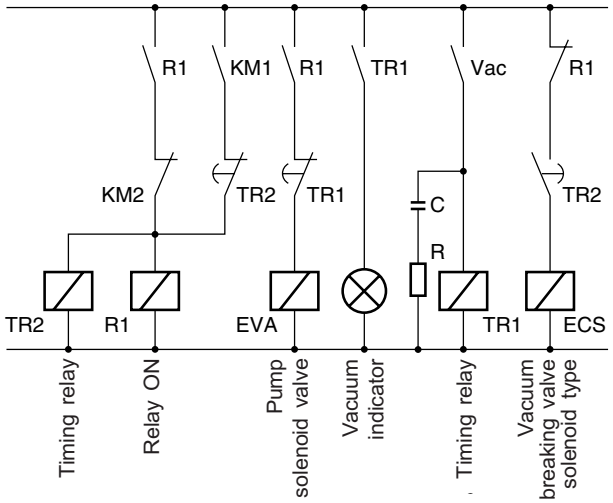


(IV) Adjustable vacuum switch

(V) Vacuum breaking solenoid valve

(VI) Vacuum maintaining valve

Diagram of a control system arrangement



KM1 : Vacuum pressure command

KM2 : Release of workpiece command

Vac : Vacuum switch

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CHOICE OF EQUIPMENT

NOTE : This system is not recommended for porous pieces.

Mounting a vacuum maintaining valve on a stwo-stage vacuum generator - Code : **550 534** (to adapt on a two-stage vacuum generator with vacuum solenoid breaking valve and vacuum switch).

Ordering example : 367 00 054 + 550 534

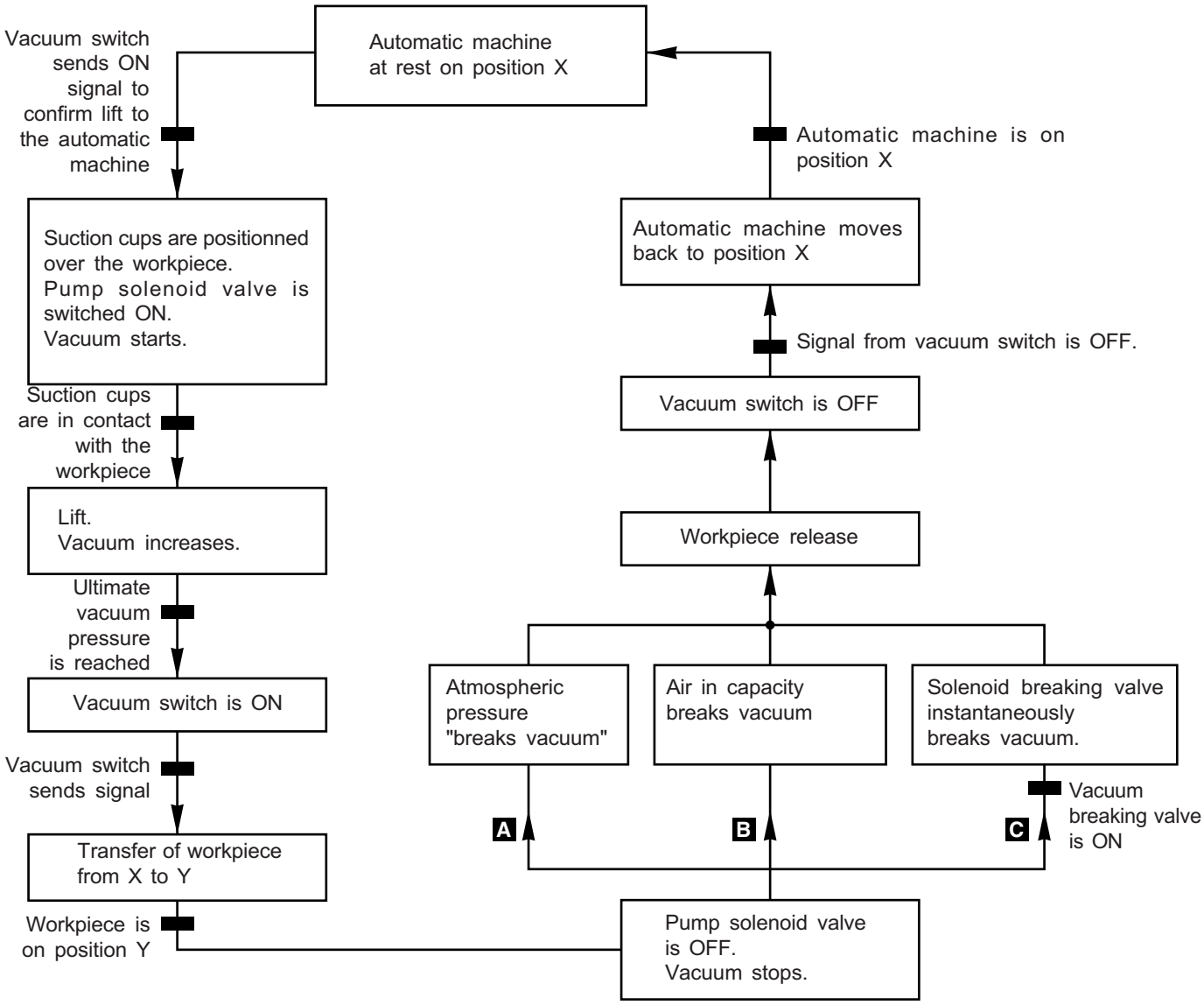
– 1 two-stage vacuum generator

– Mounting of a vacuum maintaining valve

The vacuum maintaining valve can be **supplied separately** : **881 36 716**, to be fitted on a previously delivered two-stage generator.

EXAMPLE OF OPERATING SYSTEM

The diagram below shows the successive steps of an automatic lifting and transfer cycle from a point X to a point Y. The system includes a two-stage vacuum generator, a pump solenoid valve and a vacuum switch.



A - Vacuum generator (standard model) without vacuum breaking valve.

B - Vacuum generator with vacuum breaking valve, air capacity type.

C - Vacuum generator with vacuum breaking valve, solenoid type.

NOTA 1 : If no workpiece is under the suction cup or if it is wrongly positioned, the ultimate vacuum pressure is not reached , the vacuum switch does not switch ON and the automatic machine does not move.

NOTA 2 : If vacuum decreases due to leakage during transfer, vacuum switch switches OFF and automatically stops thetransfer and / or sets off the alarm.

SELECTING A VACUUM GENERATOR

The diagram below allows selection of a single nozzle or two-stage vacuum generator, with or without accessories, according to the number and dimensions of suction cups. Selection depends on several parameters. Therefore, this diagram is only indicative. It takes the following points into account :

- Medium length of piping between suction cups and vacuum generator = 1 m.
- The diameter of piping matches the diameter of the suction cup connection.
- **Time needed to reach vacuum : - 1 second.**

Suction cup dia. (mm)	Number of suction cups per generator	Generator with muffler		Generator with vacuum breaking valve		Generator with BUILT-IN pump solenoid valve
		With or without vacuum filter	With BUILT-IN vacuum filter	With air capacity	With BUILT-IN solenoid	
Ø 10	1 - 2 3....6	SE 0,5 SE 1	DE 1 DE 1	SE 0,5 SE 1	DE 1 DE 1	DE 1 DE 1
Ø 14	1 2....6	SE 0,5 SE 1	DE 1 DE 1	SE 0,5 SE 1	DE 1 DE 1	DE 1 DE 1
Ø 18	1 - 2 3....6	SE 1 SE 1	DE 1 DE 1	SE 1 DE 1	DE 1 DE 1	DE 1 DE 1
Ø 30	1 - 2 3 - 4 5 - 6	SE 1 SE 1 SE 1,3	DE 1 DE 1 DE 1	SE 1 DE 1 DE 1	DE 1 DE 1 DE 1	DE 1 DE 1 DE 1
30 x 65	1 - 2 3 - 4	SE 1 SE 1,3	DE 1 DE 1	SE 1,3 DE 1,6	DE 1 DE 1,6	DE 1 DE 1
Ø 40	1 - 2 3 - 4 5 - 6	SE 1 SE 1 SE 1,3	DE 1 DE 1 DE 1,6	SE 1,3 DE 1 DE 1,6	DE 1 DE 1 DE 1,6	DE 1 DE 1 DE 1,6
40 x 100	1 - 2 3 - 4	SE 1 SE 1,3	DE 1 DE 1,6	SE 1,3 DE 1,6	DE 1 DE 1,6	DE 1 DE 1,6
Ø 50	1 - 2 3 - 4	SE 1 SE 1,3	DE 1 DE 1,6	DE 1 DE 1,6	DE 1 DE 1,6	DE 1 DE 1,6
Ø 60	1 2....4	SE 1 SE 1,3	DE 1 DE 1,6	DE 1 DE 1,6	DE 1 DE 1,6	DE 1 DE 1,6
Ø 80	1 2....4	SE 1 SE 1,3	DE 1 DE 1,6	DE 1 DE 1,6	DE 1 DE 1,6	DE 1 DE 1,6
Ø 85	1 2....4	SE 1 SE 1,3	DE 1 DE 1,6	DE 1 DE 1,6	DE 1 DE 1,6	DE 1 DE 1,6
Ø 95	1 2....4	SE 1 SE 1,3	DE 1 DE 1,6	DE 1 DE 1,6	DE 1 DE 1,6	DE 1 DE 1,6

SE = **Single nozzle** vacuum generator
DE = **Two-stage** vacuum generator
0.5 = Nozzle 0.5 mm dia. (single nozzle vacuum generator only)
1 = Nozzle 1 mm dia.
1.3 = Nozzle 1.3 mm dia.
1.6 = Nozzle 1.6 mm dia.