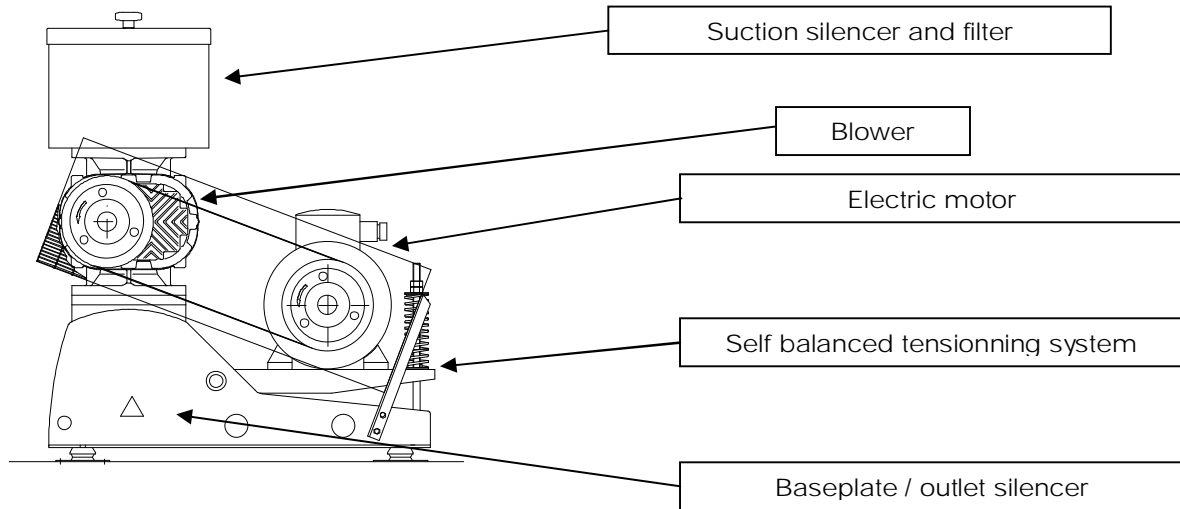
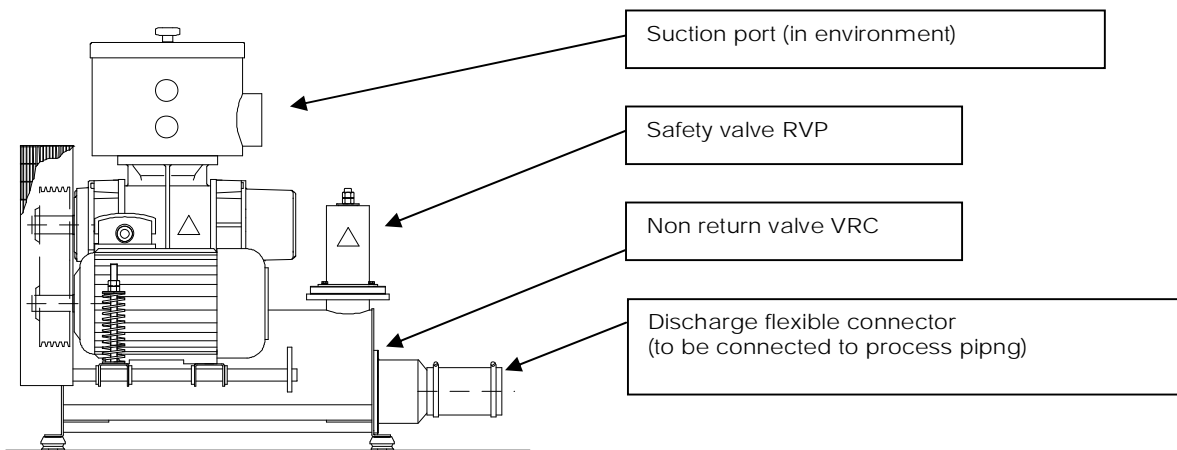


BASIC FEATURES (front view)

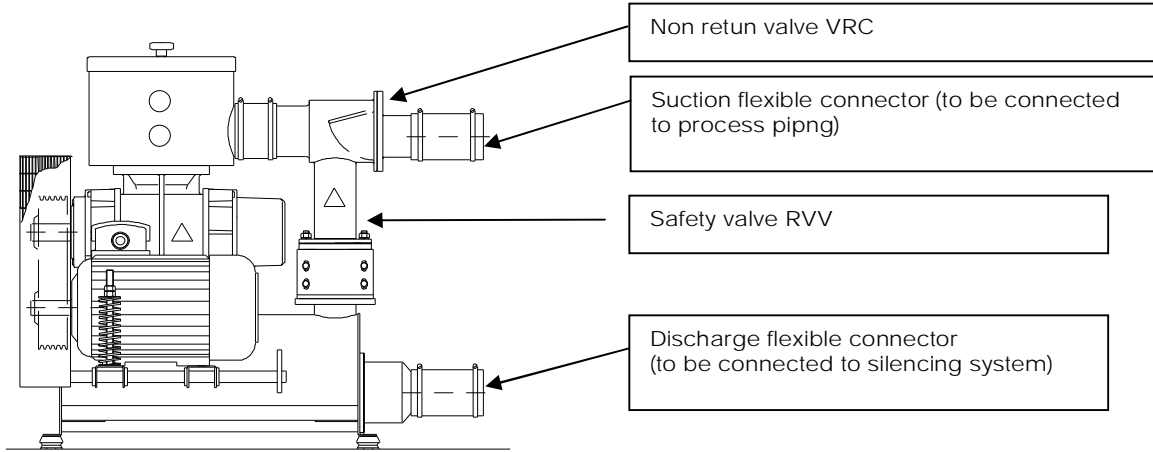


CONFIGURATIONS

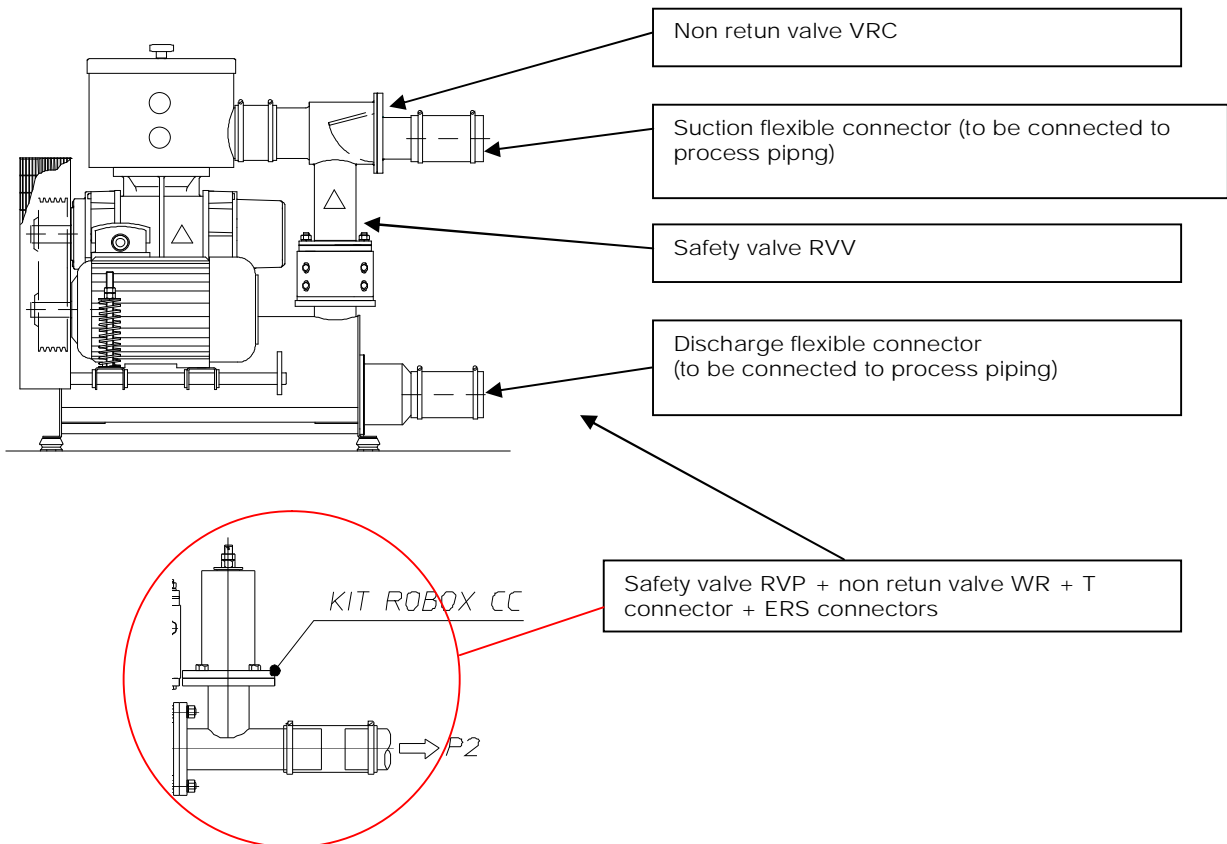
For operation as pressure blower, configuration /P (side view)



For operation as vacuum blower, configuration IV (side view)

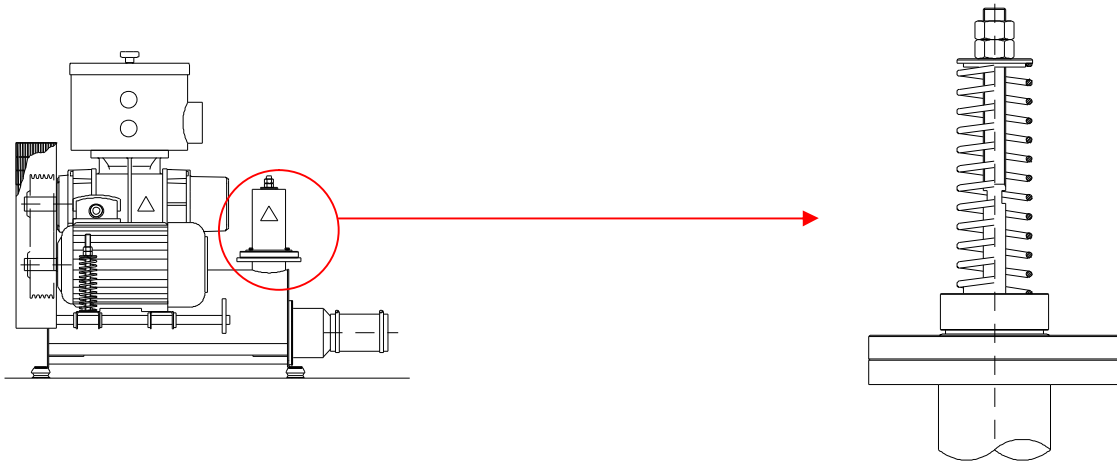


For operation as vacuum and pressure blower, combined configuration (side view)

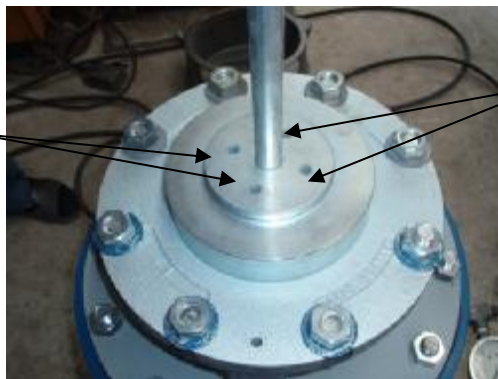


MECHANICAL PROTECTIONS

Pressure safety valve RVP.

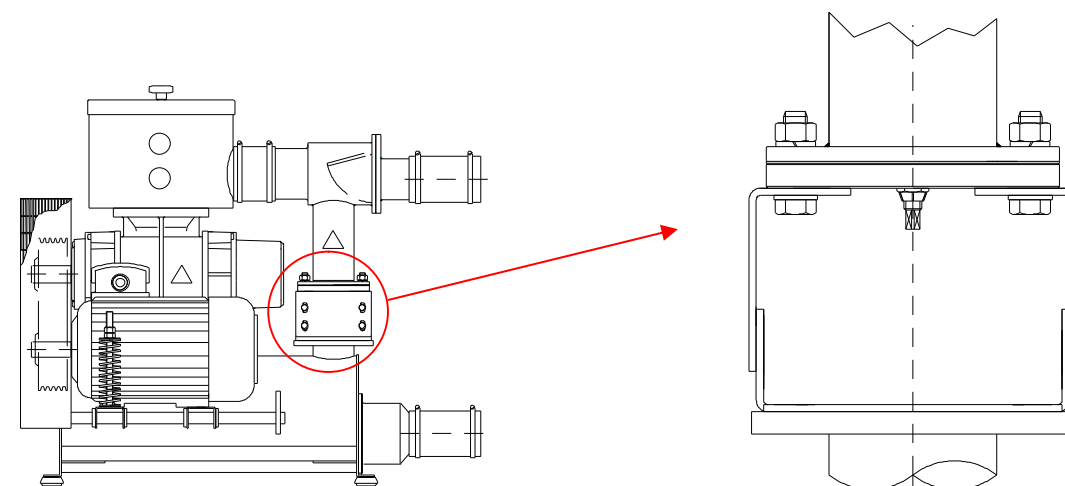


- It is used for pressure and pressure/vacuum operating mode, it is mounted on the discharge line (to be always installed before the non return valve)
- It is an emergency relief system, that protect the blower in case of clogging of discharge piping or accidental peaks of pressure
- The set up has to be done by the user when commissioning the blower. As an option, set-up can be ordered to Robuschi included in the supply.
- It is not a modulating, pressure regulation or by-pas valve. In case the application requires this kind of function, an additional valve designed for this purpose has to be mounted on the discharge pipe.
- Starting from size RVP 200, the shutter is equipped of 4 venting holes for making shut off easier, therefore after having fixed the correct set point the valve will not be tight sealed and it will release a slight air leakage



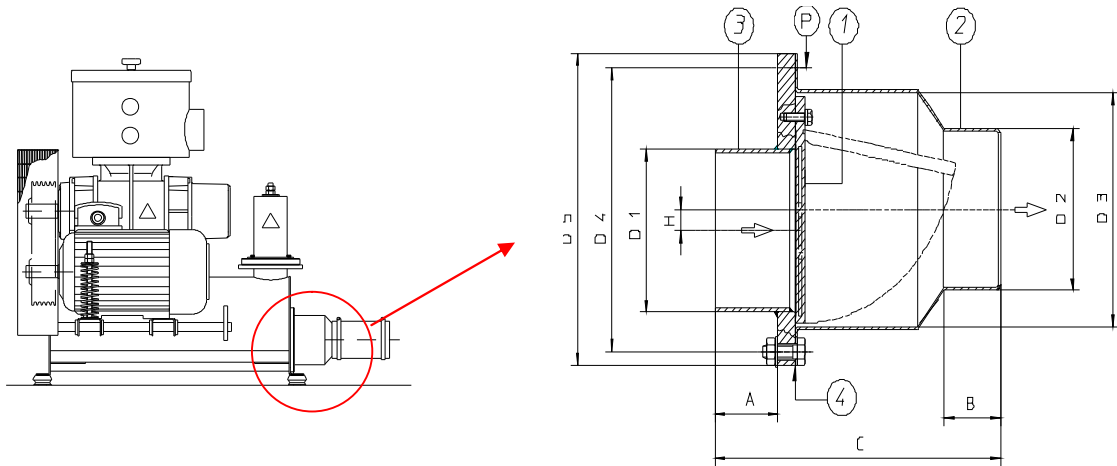
Vent holes in the shutter

Vacuum safety valve RVV.



- It is used for vacuum and pressure/vacuum operating mode, it is mounted on the suction line (to be always installed after the non return valve)
- It is an emergency air intake system, that protect the blower in case of clogging of suction piping or accidental peaks of vacuum
- The set up has to be done by the user when commissioning the blower. As an option, set-up can be ordered to Robuschi included in the supply.
- It is not a modulating, pressure regulation or by-pass valve. In case the application requires this kind of function, an additional valve designed for this purpose has to be mounted on the suction pipe.

Non return valve VRC



- This valve is used as a standard on all configurations, mounted in discharge or suction line depending on the operating mode.
- It prevents the reverse rotation of the blower when Robox unit is stopped
- The flap is made with rubber stamp (EPDM with peroxide additive and metal frame)
- Pressure loss at maximum flow rate < 10 mbar
- Maximum admissible temperature: 140 °C

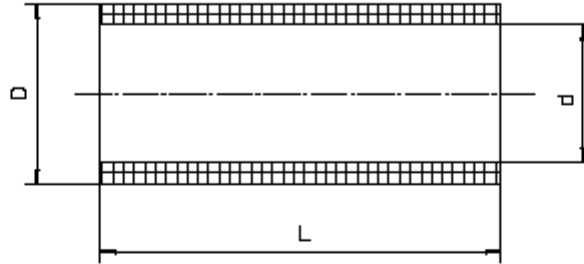
CONNECTION TO PIPEWORK

Rubber connector ER

Each Robox unit is supplied with rubber connector, for connecting the unit with the pipework of the pressure or vacuum system (see configurations).

Rated operating temperature is from -40°C to +150 °C.

Material: black EPDM high temperature resistant, with textile reinforced insert



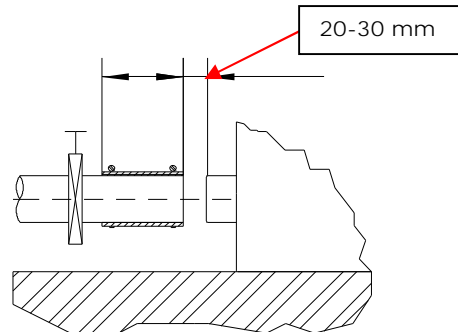
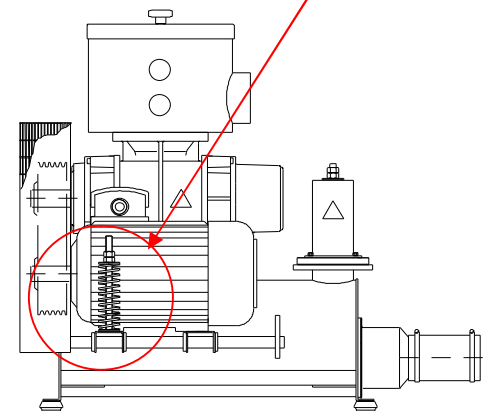
TIPO	DN	d	D	L	P.e. (bar)	P.s. (bar)
ER 50	50	60	70	200	5	15
ER 65	65	75	85	200		
ER 80	80	90	100	200		
ER 100	100	115	127	200		
ER 125	125	140	152	230		
ER 150	150	170	184	230		
ER 200	200	220	238	230	4	12
ER 250	250	275	295	230		
ER 300	300	325	345	300	3.5	10.5
ER 350	350	350	370	300		
ER 400	400	400	420	300		
ER 500	500	508	527	400	2.5	7.5

Pe: maximum design pressure

Ps: bursting pressure

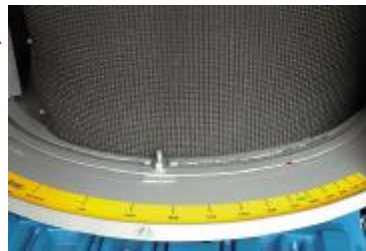
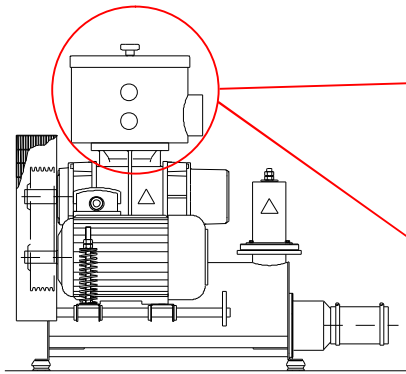
Discharge flexible connector is shipped with Robox package, fixed on motor tensioning spring

Distance between Robx pipe and system pipe should not exceed 20-30 mm, in order to reduce thermal and pressure stresses on the flexible connector



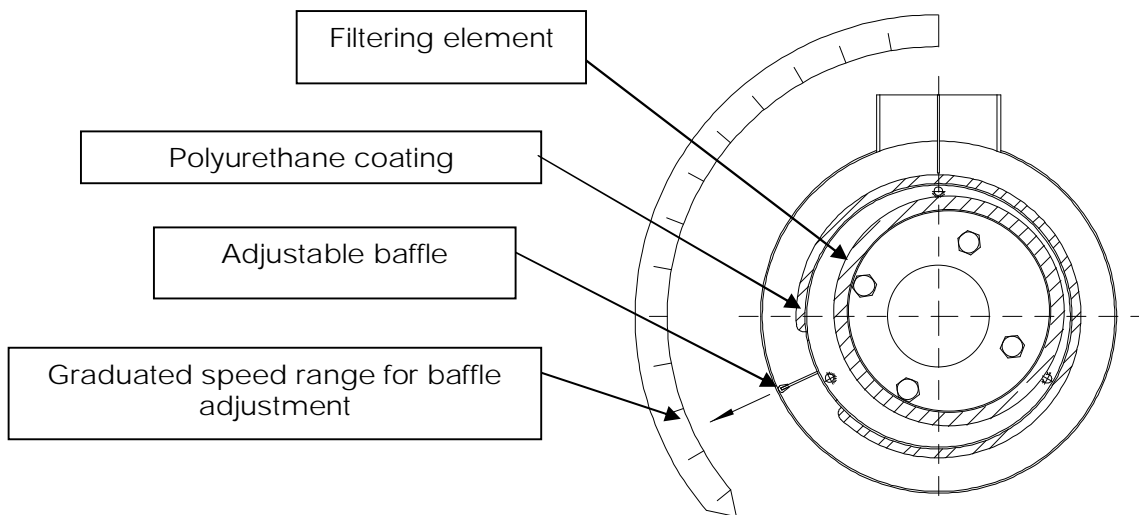
SILENCERS

Suction silencer SPF

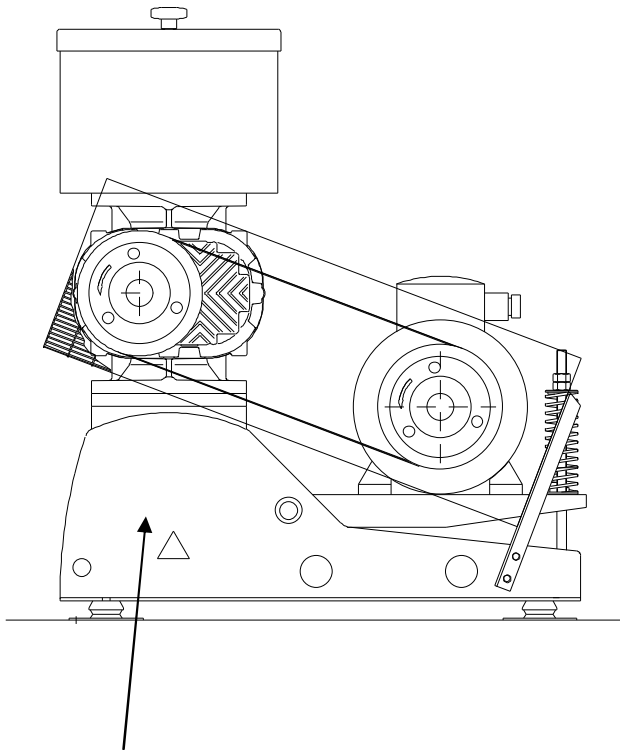


- It is a reactive and absorptive silencer, with noise reduction of 16-18 dB(A)
- The reactive part is equipped with adjustable baffle, which improves the sound reduction depending on the blower speed.
- The absorptive part is made of polyurethane coating, stuck on the cylinder frame and equipped with plastic retaining net
- It includes integrated filtering element, with filtration grade EU 4 DIN24185

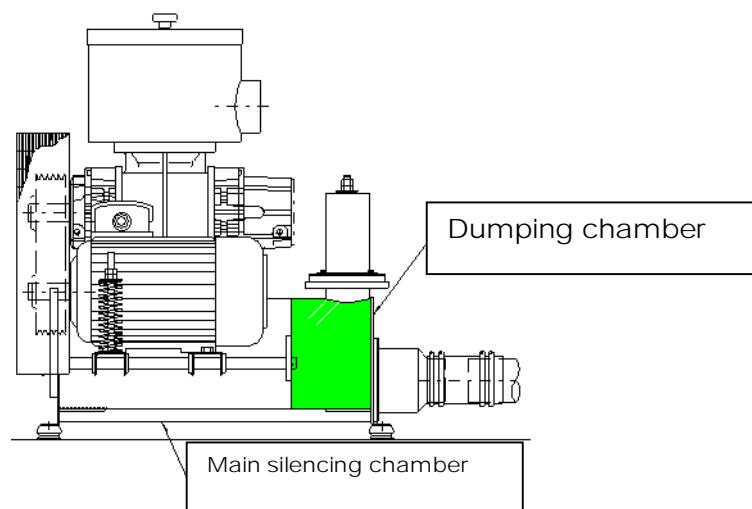
Inner components of silencer/filter SPF: top view



Discharge silencer



- It is a reactive silencer
- Thanks to its constructive feature, it does not release sound absorptive material in the discharge line, preventing any air pollution in the process, and it is not subject to wear
- The silencer includes an integrated dumping chamber, designed for getting best dumping effect at wide speed range without need of manual adjustments



NOISE INSULATION

- All Robox units can be supplied equipped with noise enclosure.
- Robuschi noise enclosure is designed for enabling the installation of more units side by side, and do the maintenance operations on the front size, equipped with door and key-lockers .
- Noise enclosure is made with galvanized plate (galvanization 200 g/m²)
- The panels are internally coated with polyurethane sheet, open cell structured, 50 mm thick, (indented profile, density >30 kg/m³).
- Polyurethane is self extinguishing, with fire resistance specs UL94 HF1, class 2 for CSE RF2/75A and CSE RF3/77



ROBOX NOISE ENCLOSURE VENTILATION



All Robox units with noise enclosure are equipped with electric cooling fan, for sucking hot air out of the enclosure.

Robox size	Fan type	Rated flow m3/h	Tension Volt	Frequency Hz	Current A	Power W
1	CLU 200-23-2T	500	400	50	0,28	95
		600	480	60	0,32	140
2	CLU 250-23-2T	1300	400	50	0,30	137
		1500	480	60	0,34	203
3	CLU 300-23-2T	1900	400	50	0,33	176
		2100	480	60	0,39	260
4	CAL 310-27-2T	5000	400	50	0,81	414
		5600	480	60	0,95	640
5	A5-504-23-ET	9000	400	50	1,59	550

Protection grade IP 54 (ROBOX 1,2,3,4) Insulation class: F

Protection grade IP 55 (ROBOX 5)

Limits on input parameters, for standard electric fans

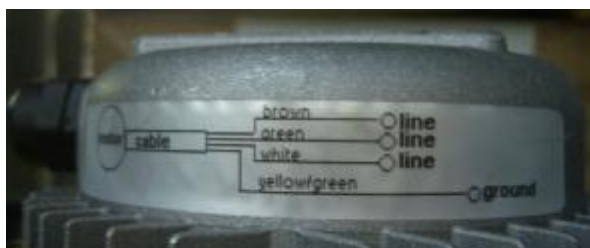
1) Threephases 50 Hz 400 V, with +/- 5% tolerance (da 380 V a 420 V)

2) Threephases 60 Hz 480 V, with +/- 5% tolerance (da 456 V a 504 V)

WARNING : For parameters non complying the standard rates, ask for selection of special fan to Robushi.

Electric connections:

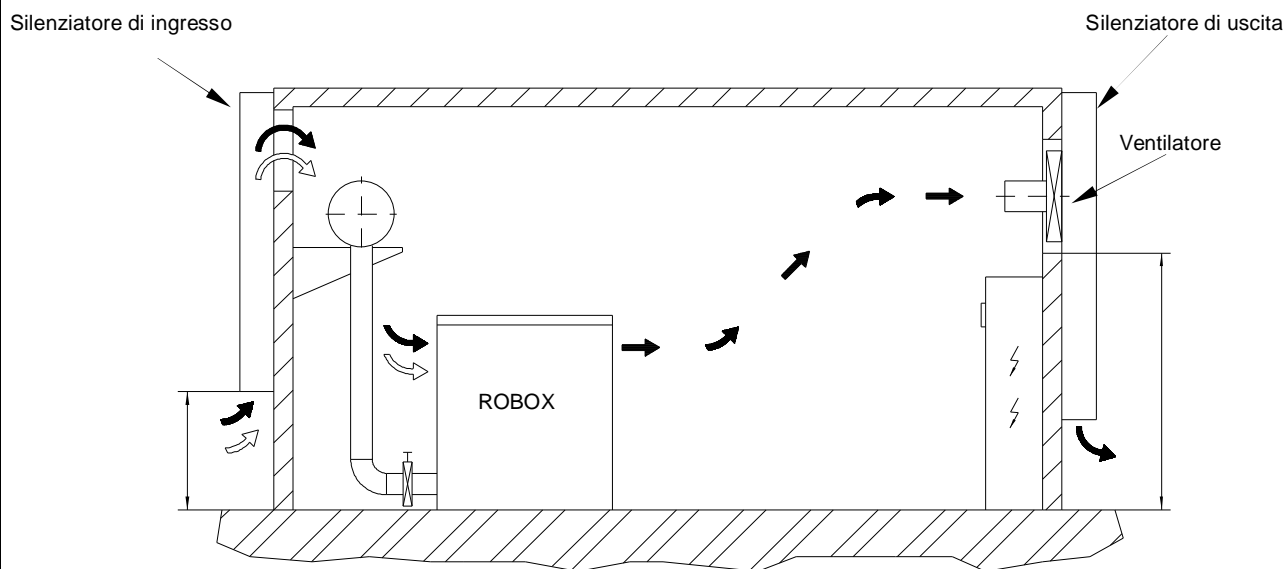
- Standard motor is supplied without connecitons and junction box. The motor can be connected only in star mode, the three phases have to be connected in order to get the correct verse of rotation (extraction of our air out of the enclosure)



- Connect the motor fan in order to get it started and stopped together with the main motor that drives the blower
- For environmental temperature exceeding 30 °C delay the stop of the motor fan of 15 minutes after the stop of main motor
- Set the electric board in order to disable the main motor in case the motor fan is stopped ot out of order.

BLOWER ROOM VENTILATION

In case of indoor installation, it is essential to design a proper room ventilation, with well sized windows for fresh air intake and fans for hot air extraction, as per basic drawing below.
For further details about room and fans design, please contact Robuschi.



In case of outdoor installation, it is essential to build a canopy or roof for protecting the Robox from sun beams and other atmospheric agents.

INSTRUMENTATION

All Robox units supplied with noise enclosure are equipped with following instrumentation

- Pressure discharge gauge (for units in /P and combined configuration). Glycerin Wika manometer, pressure range 0/1.6 bar, with breathing valve for the glycerin box, connected to blower discharge port.
- Filter clogging gauge (for units in /P configuration). Wika dry vacuum gauge, vacuum range 0/-60 mbar, with clogging grade colored bands, and maximum vacuum pointer, connected to blower suction port.
- Vacuum gauge (for units in /V and combined configuration). Wika dry vacuum gauge, vacuum range 0/-1 bar, connected to blower suction port.



Filter clogging gauge

Discharge pressure gauge



Units not equipped with sound enclosure can be supplied as well with above described instrumentation, upon specific request on the order

LUBRICATION

- Robox units are supplied with dry oil sumps, oil filling has to be done on site before commissioning
- Upon specific request in order, oil can be supplied included with Robox package
- Robuschi recommends to use PAO oils, for their better lubricating properties, their suitability at high and low temperatures, their better resistance to oxidation. Even if nominal oil change interval are the same, practically PAO oils have longer life and allows more flexibility on oil changes.
- Robuschi recommends to select viscosity grade ISO-VG 220, except from extreme environmental conditions (check in any case operating limits, room ventilation specs and advice for outdoor installation on Robuschi instruction manual).

We hereby attach a list of some brands commonly marketed, and the corresponding P.A.O type.

BRAND	TYPE	VISCOSITY GRADE
Agip	Blasia only serie sx	ISO VG 220
BP	Energol HTX	ISO VG 220
Castrol	Alphasyn HG range	ISO VG 220
Molyguard	Gear sint sx	ISO VG 220
Fuchs	Renolin Unisyn	ISO VG 220
Mobil	SHC 630	ISO VG 220
Nils	Atoil synth 75W/140	ISO VG 220
Repsol	Super tauro sintetico	ISO VG 220
Shell	Omala HD	ISO VG 220
Total	Carter SH range	ISO VG 220

In case of application with possible contact between pumped air and food products (food processing systems, food packaging systems, pharma process industry, and similar), customer may ask for lubrication with no-tox oil. Thus lobes blowers are 'oil free' machines (as pumping parts are not lubricated as they are in dry-chamber), they can not assure a total lack of air contamination with oil particles and aerosol.

We hereby attach a list of some marketed brands, with corresponding oil type complying USDA-H1 standards, we recommend in any case to carefully check the suitability for the specific application, on the basis of the process specs and eventual law requirements.

BRAND	TYPE	VISCOSITY GRADE
Bel-Ray	No tox synthetic gear oil	ISO VG 220
Klüber	4 UH1 - 220	ISO VG 220
Nils	Rypress sint food	ISO VG 220
Shell	Cassida Fluid GL	ISO VG 220
Total	Nevastane SL	ISO VG 220

Correct oil quantity and level are reported in instruction manual.
Starting from size 2, all Robox are equipped with external oil level gauges, for making oil level check during operation easier and quicker.



ELECTRIC MOTORS

Robox units are normally supplied with electric motor (brand ABB, Felm, Siemens).

Windings and connection

- Motors supplied by Robuschi are winded for eurotension (see general specs in table 1). For details about suitability of motor to the local input parameter please contact Robuschi.

Power	Tension at Δ	Tension at Y
Up to 11 kW	230 V	400 V
Over 11 kW	400 V	690 V

11 kW motors are available with both windings arrangements.

Tab 1

- Motor with eurotension winding can be used with 60Hz frequency, provided that input tension is increased as well compared to the 50Hz standard tesnion. In this case, the motor will supply a power increased as well, compared to the 50 Hz standard. (see example in table 2).

Example: 22 kW 2 poles motor, eurotension M2QA 180 M2A B3	
Power supplied @ 50HZ	22 kW
Input tension for operating @ 50 HZ / Δ	380-415 V
Speed @ 50 HZ	2930 rpm
Power supplied @ 60HZ	25.3 kW
Input tension for operating @ 60 HZ / Δ	440-460 V
Speed @ 60 HZ	3528 rpm

Tab 2

- Motor selection is done on the basis of operating data reported by the customer, with proper margin for compensating motor and drive efficency loss.
- Motors supplied by Robuschi can be started with direct start mode, or Y/ Δ , or by using softstart devices or VSD, depending on system configuration. For tension correspondance at Y/ Δ connections, see table 1.

Extra cooling kit

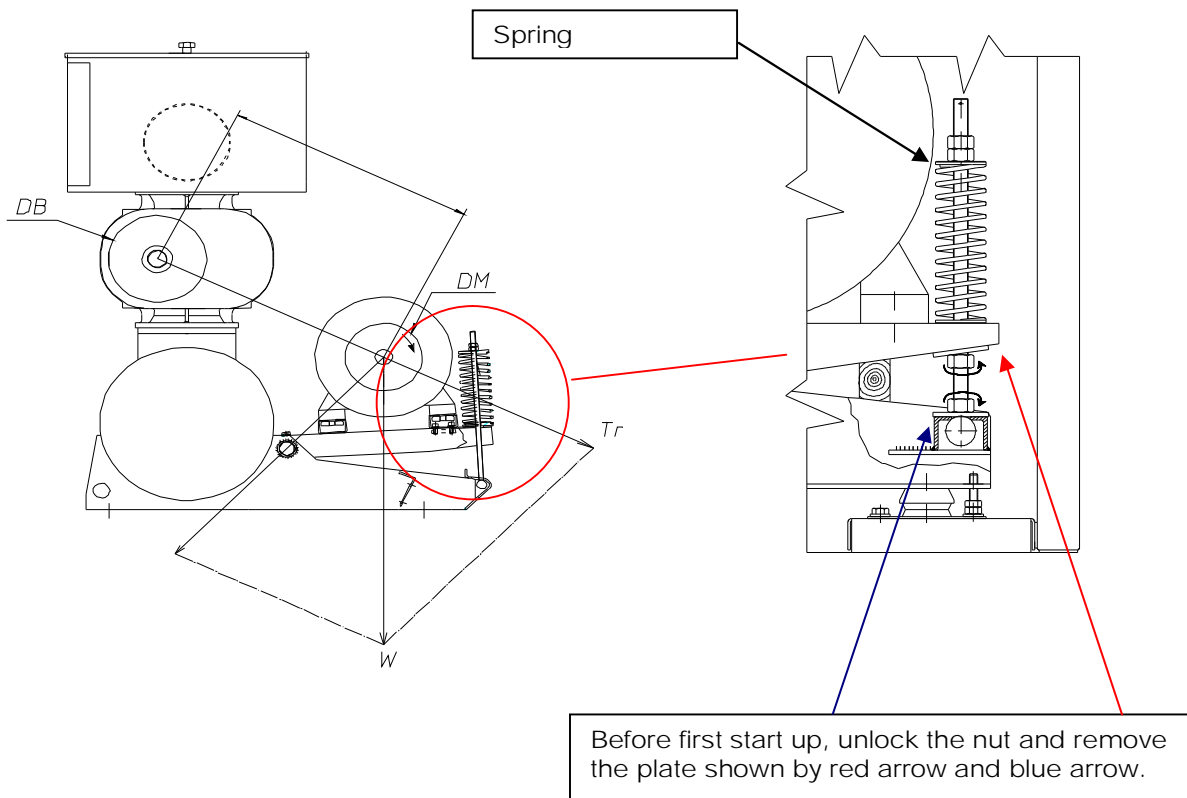
- In case of VSD drive, Robuschi reccomends the use of extra cooling kit, and and to set up a minimum admissible freqeuncy for preventing blower overheating, (for details about set up, contact Robuschi)
 - Extra cooling motor has to be connected for operation at constant frequency of 50 Hz, disabling main motor operation in case of extra cooling motor failure. For specs of extra cooling motor (amps, tension), contact Robuschi.
- Other optional arrangements
- PT100, PTC, heaters, greasing nipples as well as windings for non standard tensions are available upon request.

DRIVING SYSTEM

Robox units are supplied with v belt driving system

Design and selection

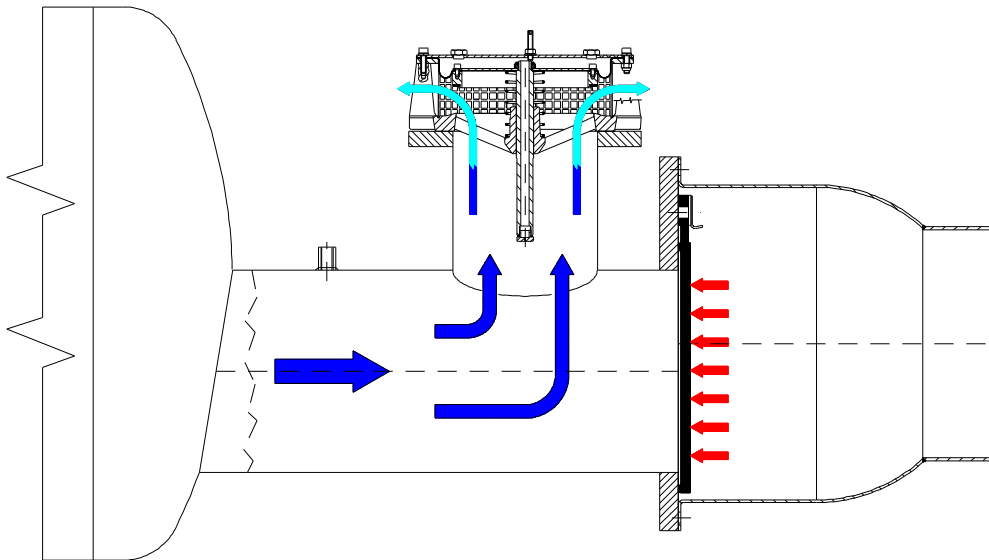
- Belt drive selection is based on operating data reported by the customer. Design and selection criteria are taken from main belt producers standards, providing a further margin for ensuring a satisfactory belts life (15000 hours as per instruction manual)
- Robuschi selection program enables to choose 'full contour belts' (S type) or toothed contour (X type). X type belts have higher torque transimission limits, i.e. they can trasmit the same torque with a lower number of races. X type option is therefore recommended when S type limits do not allow drive selection because of too high number of races. The design ratio is the same for X type and S type belts, therefore the option of X type belts does not increase itself the design ration, as selection program automatically reduces the number of races when X type option is choosen.
- Belts tensioning Belt tensioning on Robox units is basically primed by vector T_r of motor mass W , thanks to the self-balanced mounting system. The spring has the main purpose of completing the accurate regulation of tensioning, and preventing motor jumping at the start up. The spring setting has to be done when commissioning the robox
- All Robox are shipped with motor moutning system locked, for preventing vibration and stresses on bearing and belts during handling/freight. Locking plates have to be removed when commissioning the Robox, for enable the correct belt tension.



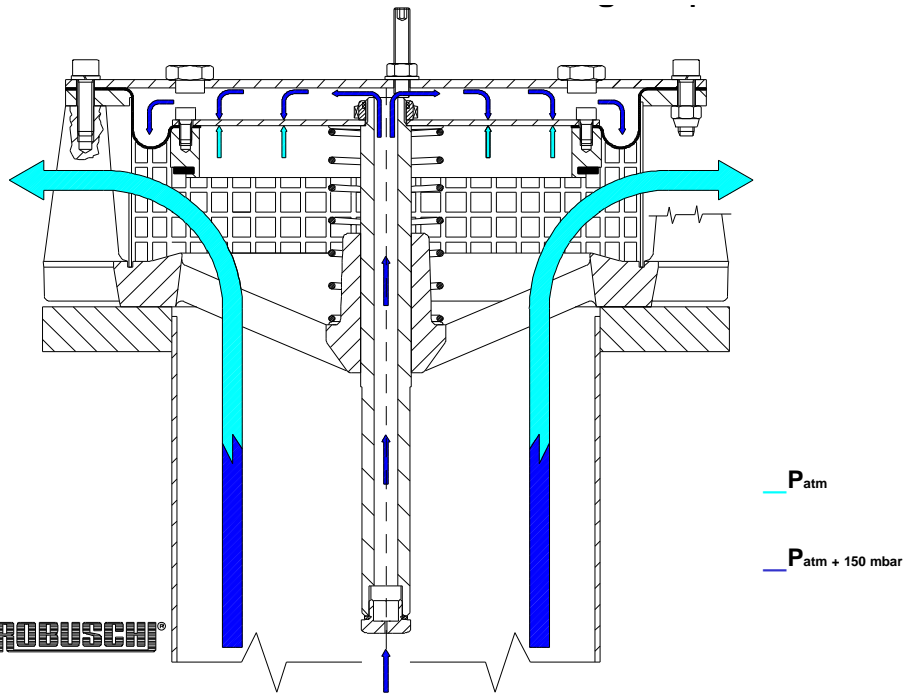
ACCESSORIES

Unloading valve VSM

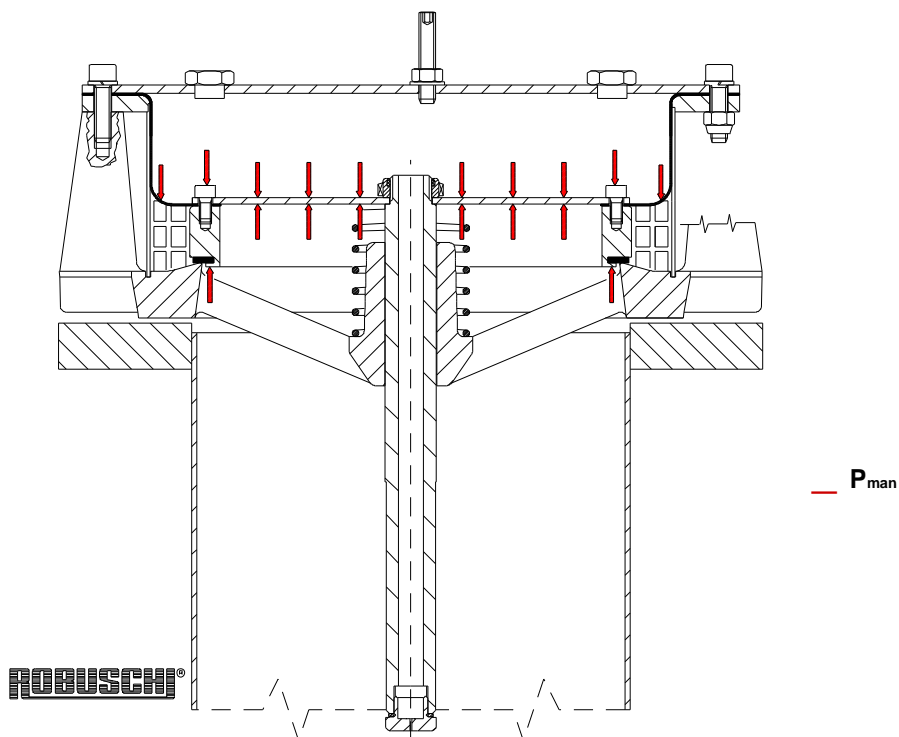
- It enable to start the Robox without pressure load, for preserving motor (lower start up currents) and electric system from overloads.
- It is a normally open pneumatic valve, the shut off is made thanks to the pressure in the system and the capacity delivered by the blower. Therefore it has strictly used on static pressure system (Oxidation in WWTP: yes. Pneumatic convey: no)
- The use of VSM is not suggested when Robox is driven with softstart devices or VSD as in this case the unloading function becomes useless. Soft start or VSD have to be selected properly (minding that a blower is a constant torque machine).
- When selected, the VSM is installed in place of the RVP valve, as the pneumatic pilot provides also the safety valve function to the VSM.



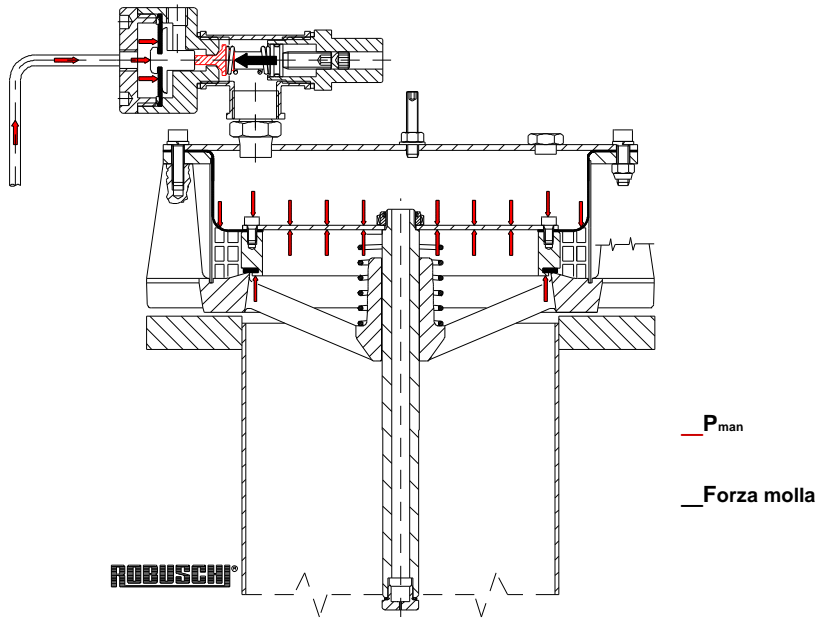
— $P_{atm} + 150 \text{ mbar}$
 — P_{atm}
 — $P_{statica}$



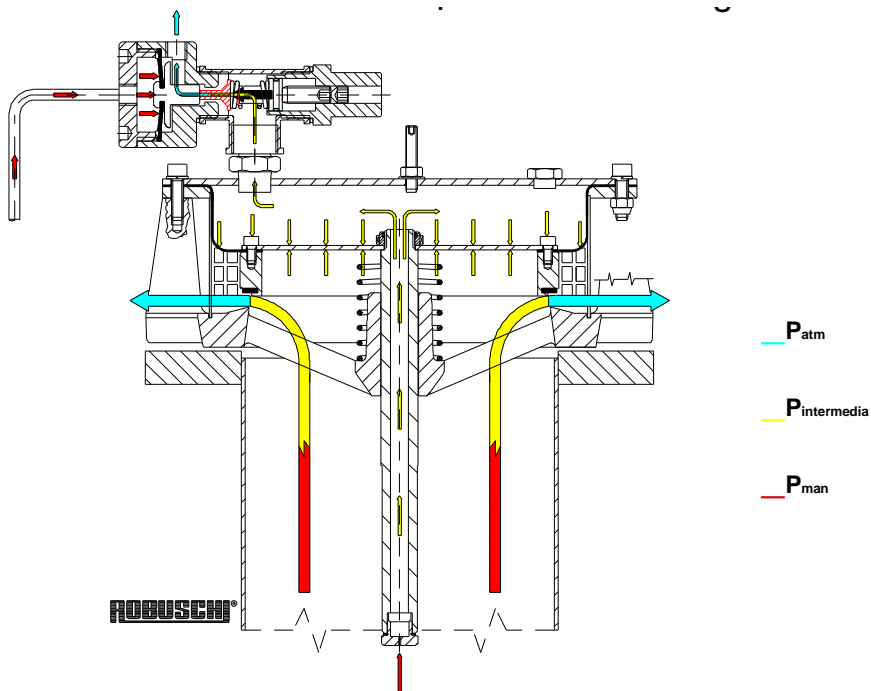
VSM: fase di chiusura



VSM: chiusa



VSM con pilota pneumatico: chiusa



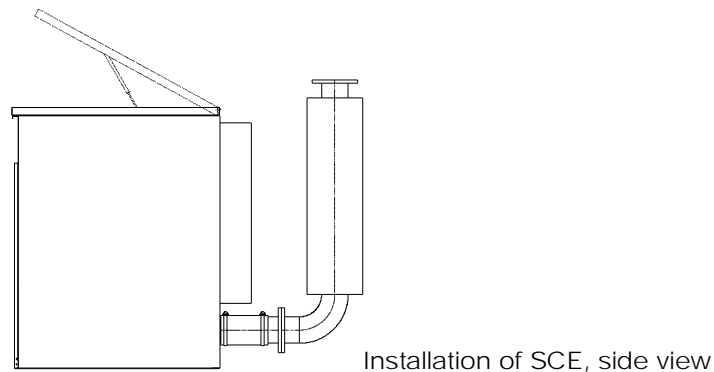
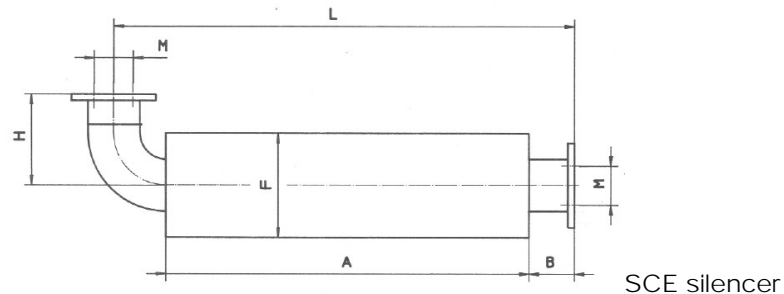
VSM con pilota: apertura come valvola di sicurezza

Optional silencers

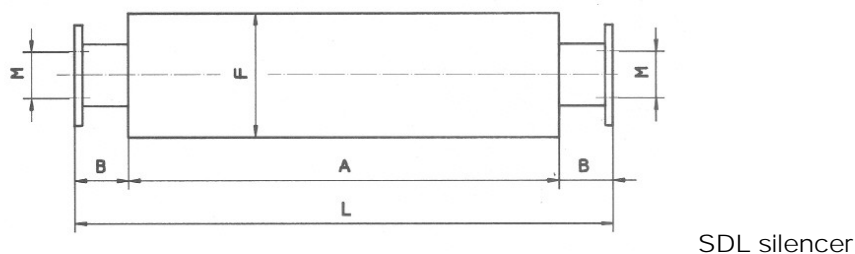
The noise emission level of each Robox unit is reported in every selection, offer and order confirmation. It is resulting from the mean of 4 measuring points at 1 m from each Robox side. Provided the good efficiency of standard silencers and sound enclosure, this value may not correspond to the final noise level on field, due to variable factors that Robuschi can not estimate, such as environmental reverberations, environmental noises, resonances on process piping, noise emission of process piping.

For supporting customers in optimizing field noise emission, Robuschi has developed auxiliary silencers to be installed when needed for completing the standard configuration. As the maximum noise energy is coming from blower discharge, the installation of optional silencers is generally suggested on the discharge system of the plant. For details, dimensional drawings and quotation, contact Robuschi.

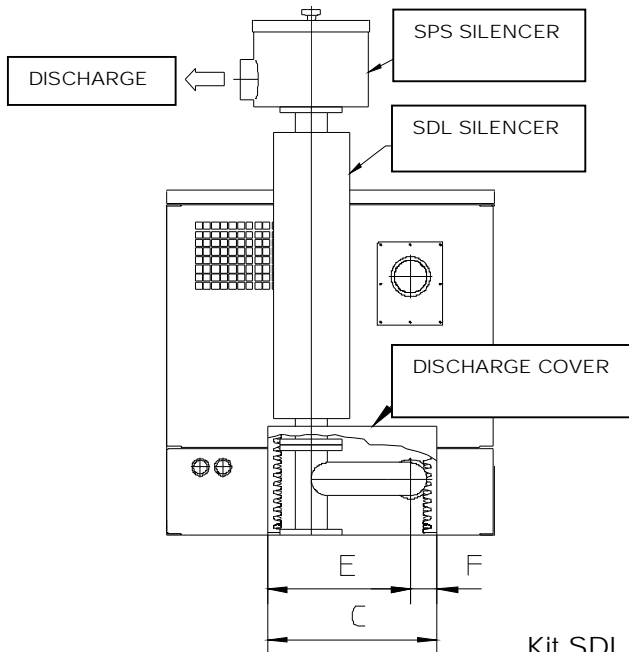
- SCE: reactive/absorptive silencers, particularly effective on medium frequency range, manufactured with sound absorption material insulated from gas flow for preventing gas contamination, available from DN 50 to DN 500, with integrated 90° bent, and UNI standard connecting flanges.



- SDL: reactive/absorptive silencers, particularly effective on medium frequency range, manufactured with sound absorption material insulated from gas flow for preventing gas contamination, available from DN 50 to DN 500, with straight development, and UNI standard connecting flanges.



- SPS: reactive silencers, particularly at low frequency range, manufactured on the basic design of SPF suction filter and developed for installation on the discharge system. Very suitable for silencing Robox in vacuum configuration, in kit with SCE or SDL effective noise reduction in wide frequency range.



Kit SDL + SPS + discharge cover installed on Robox discharge system, rear view

A further noise reduction measure on field is the insulation of discharge piping, especially when problem is mainly related to piping emission. Insulating mode is described below, and shall be applied in the most critical positions of the piping.

