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Air Hammer & Pneumatic Vibrator

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APPLICATION

INTRODUCTION

In automatic factories, there are different piping systems, conveyors, weighing arrangements, life testing equipments, and dust collectors for production process.
Material characteristic(moisture, S.G., size..) and equipment design (shape, layout...) are usually the causes of medium accumulation in the pipes and tanks.
By applying pneumatic vibrators in the problem area, it will provide the best solution. Pneumatic vibrators will shake off the clogged or attached material and eliminate friction during automatic production.

WORKING PRINCIPLE

Vibration is created by the high centrifugal force of the circulating steel roller, which runs on a steel ring at very high frequency.

MERIT OF VIBRATORS

The body of pneumatic vibrator is made of strengthened aluminum alloy. It is simple structured small size vibrator with strong vibrating force. The vibrator is responsive for sudden activation / deactivation, which eliminates the damage of the equipments to the minimum level.
The vibrator is forced by compressed air. It is easily operated without spark. The working principle does not cause sparks, which can be applied in hazardous, humid or other severe environment.
Power force, frequency and amplitude can be adjusted while operating.

MODERATE TYPE

Model / Application	Air hammer	Piston vibrator		Pneumatic vibrator		
	BAH	BVP10000-01 Strike	BVP10000-00 Cushion	BVK BALL	BVR ROLLER	BVT TURBINE
Get rid of blockage	■	■	■	■	■	■
Pipe accumulation	■	■				
Derust piping		■		◢	◢	
Vibrating delivery sieving			■	■	◢	■
Arrangement & Conveyance			■	■	◢	■
Filling & Packing				■		■
Defoaming while filling		■		■		■
Concrete injection		■			■	
Sand compacted while molding				■		◢
Static electricity coating						■
Life testing			■			■

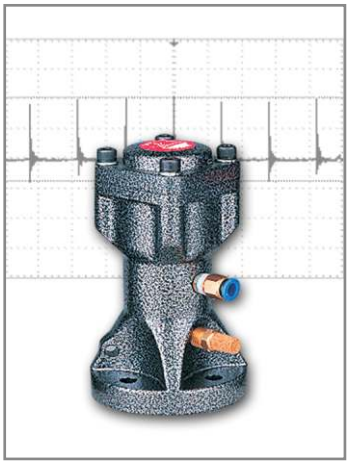
■ Excellent ◢ Fair

BVP SERIES PISTON VIBRATOR (IMPACT MODEL)

FEATURES

1. Highly strengthened aluminum body.
2. Low frequency/ continuous impact model, sudden activation/ deactivation.
3. Frequency and amplitude of impact can be adjusted as required.
4. Direct impact onto target object to produce the optimum vibration feedback.

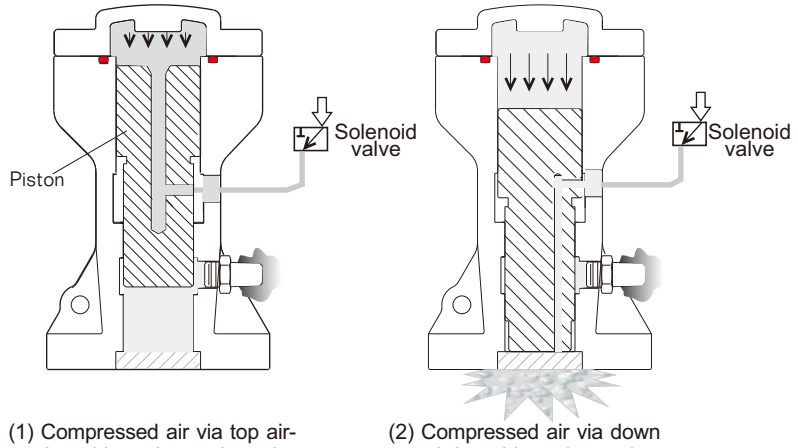
Direct impact of piston impact type can get rid of rust and material attachment inside the pipes, and low S.G, high moisture material, and material built-up in the tank.



Temperature: -40~100°C
Noise level range: 80-115 dBA

WORKING PRINCIPLE

There are air- breathing tubes located in both end side of cylinder.
Air will be compressed in to push piston from one side to the other side.
Vibration is arose by the back and forth movement of the piston in the body.
Air cushion at top end will keep piston away from striking onto the body.
On the other hand, piston will strike directly on the bottom of the body to produce strong impact.



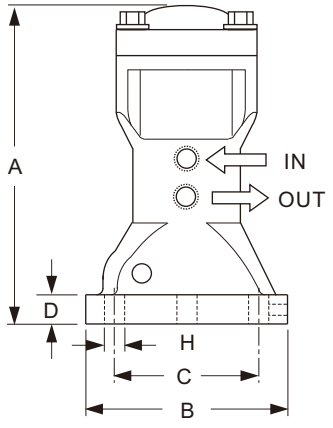
(1) Compressed air via top air-breathing tube pushes piston moving downward. Air in the bottom will be exhausted via outlet hole.

(2) Compressed air via down air-breathing tube pushes piston moving upward. The movement repeats from step (1)

NEW/OLD MODEL NO. COMPARISON TABLE

Old Model No.	New Model No.
BVP-30S	BVP10000-0130
BVP-40S	BVP10000-0140
BVP-60S	BVP10000-0160

Unit= mm



Model No.	A	ϕB	ϕC	D	ϕH	IN	OUT
BVP10000-0130	138	80	60	12	9	1/8" PF	1/8" PF
BVP10000-0140	166	100	75	16	11	1/4" PF	1/4" PF
BVP10000-0160	208	140	105	16	15	1/4" PF	1/4" PF

Model No.	FREQUENCY (V.P.M.)			FORCE (N)			AIR CONSUMPTION (ℓ / min)	WEIGHT (g)
	2kg/cm²	4kg/cm²	6kg/cm²	2kg/cm²	4kg/cm²	6kg/cm²		
BVP10000-0130	1900	2800	3500	3600	5400	6200	250	1.0 kg
BVP10000-0140	1700	2400	3000	6450	8750	9400	270	2.1 kg
BVP10000-0160	1200	1800	1900	6900	12850	13850	300	4.8 kg

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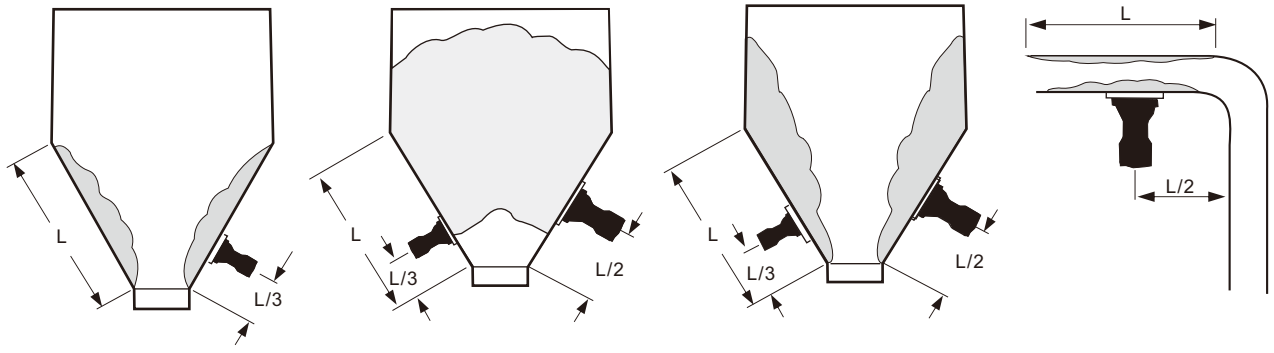
ACCUMULATED MATERIAL SOLUTION

Different applications require various tanks. Customers choose appropriate vibrators to meet application demand (tank shape/ material, applied material humidity/ S.G./ granule size…). Suitable vibrator will not only prevent obstruction problem but also avoid the damage of tank wall.

Big amplitude, low frequency piston types are suitable in granule with small S.G. .
AB1/AB2/AB3 types are better choices for high S.G. or material accumulation in filtration environment.
It is recommended to use multiple vibrators in serious clogging situation or big tank surrounding.

Accumulation condition and vibrator installation

According to various clogging situations, the recommended vibratiors and suitable installation positions (usually 1/2L or 1/3L) are shown by below.



Vibration force calculation

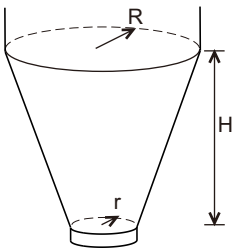
Taking accumulation situation into consideration, appropriate vibrator will give 0.2~0.4 G accelerated vibration force onto target object.

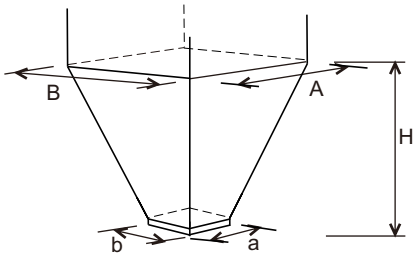
F=0.2~0.4GW,

F: Vibration force (N)
G: 9.8m/s^2
W: Material weight (KG)

Material weight calculation

W: Material weight (KG)
V: Chute volume (m^3)
γ: Specific gravity





$W=1000V\gamma$ $V=\frac{\pi H}{3}(R^2+Rr+r^2)$ $V=\frac{H}{6}[A\times B+(A+a)(B+b)+a\times b]$

EX: Cone tank, R=3.5m, r=2.5m, Tank height H=2m, material S.G=0.8, please calculate the vibration needed for this tank.

Sol: Get volume of material first (please refer to fig. on the right for formula) .
Material Weight (W)=volume(V)*specific gravity(S.G)
Vibration F=0.2 GW (G=9.8m/s^2, W=material weight)

Cone volume V= 3.14*2/3(3.5*3.5+3.5*0.5+025*0.5)=29.83(m^3)
Material Weight W= 29.83*0.8=23.86=23680(kg)
Vibration F= 0.2*23860*9.8=46765 Newton Force(N)

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INSTALLATION

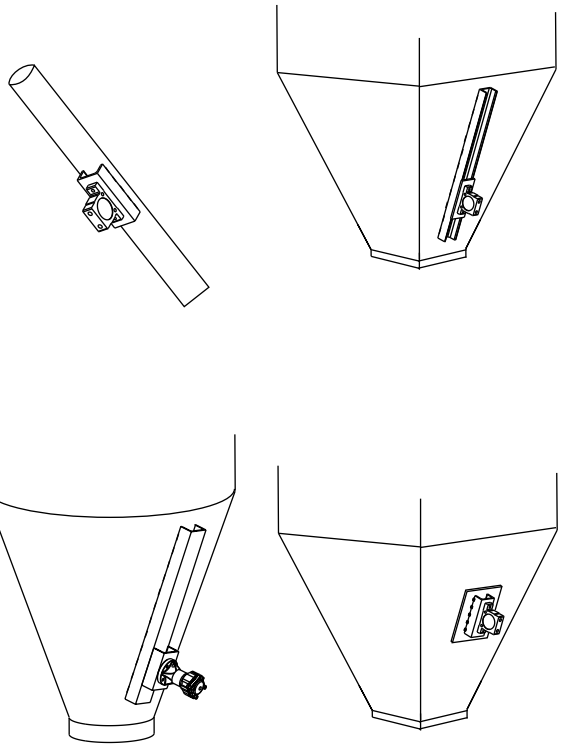
Vibration force transmits more efficiently in conical hopper tank than in rectangular hopper. It is recommended to install two vibrators for rectangular hopper application.

1. Vibration force can be transmitted more efficiently by using U shape steel supporter. It can help material fall smoothly in the tank or pipe. It also reduces tank damage.

2. U shape steel or fixer can prevent irregular movement of vibrators. To avoid possible damage on the tank wall caused by vibration force, stitch weld method is suggested. (10mm space will be required on two ends of U shape steel)

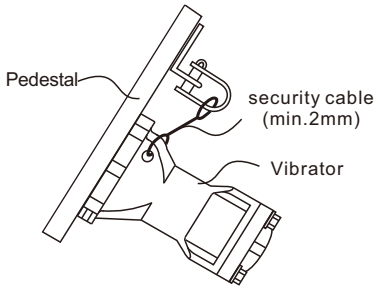
3. Reinforced board is required between U shape steel and thin tank wall.

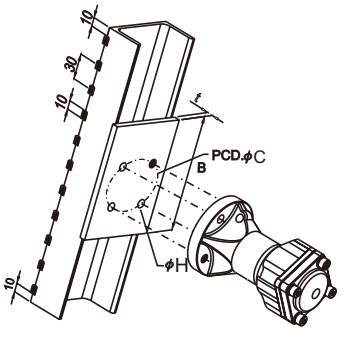
4. Cross installed of U shape steel can increase vibration field in big hopper tank.

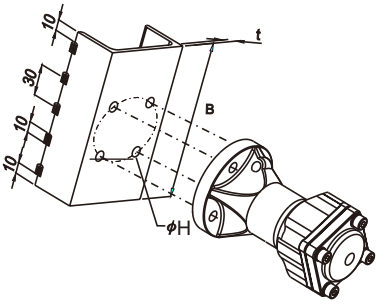


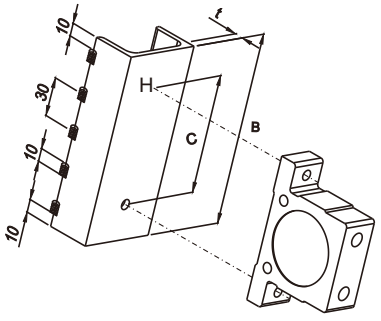
ATTENTION

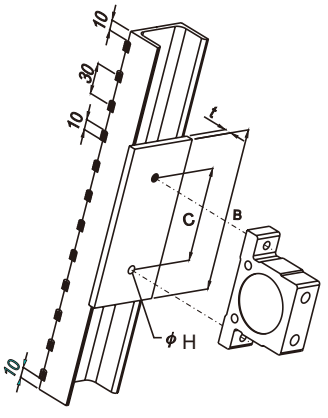
Vibrator has to be fixed by high tension bolt, washer, and spring washer. It is suggested to use security cable if vibrator is installed onto hopper.

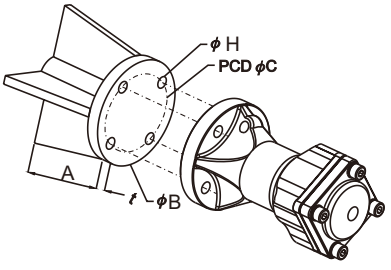












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AIR SUPPLY AND LUBRICATION

AIR SUPPLY

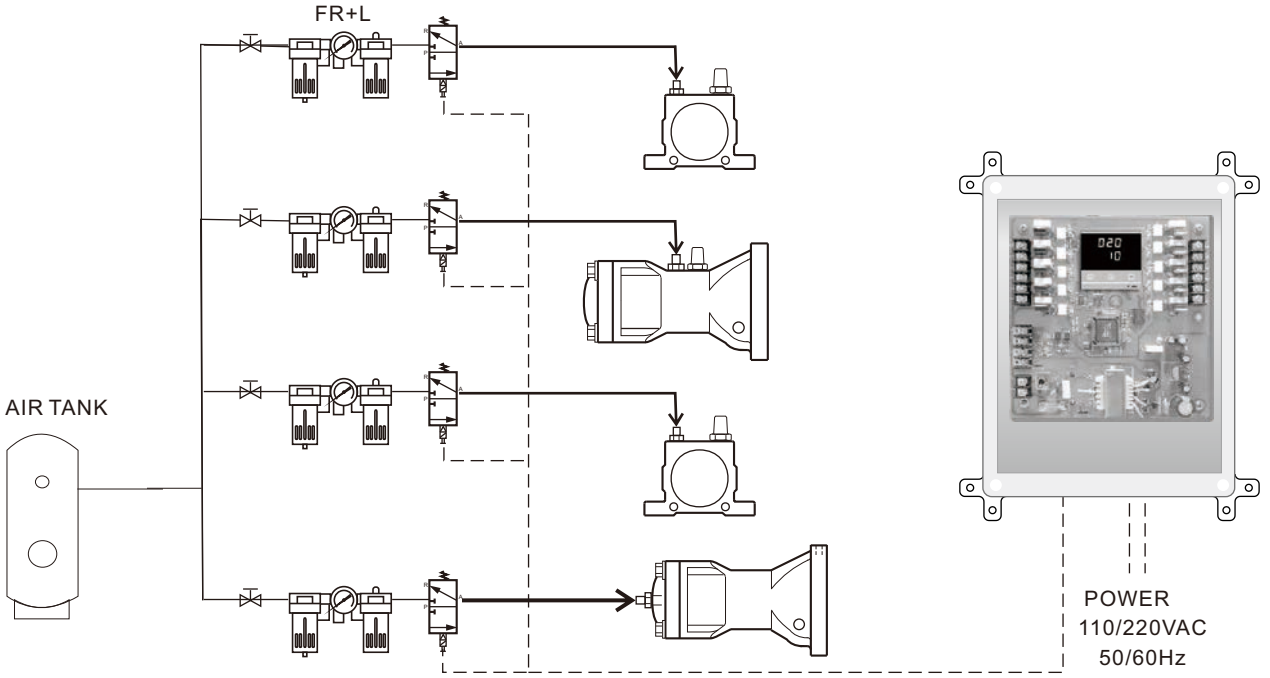
The moisture in the compressed air will erode pipes and accessories, then weaken the vibrator's performance. Make sure necessary steps are followed before applying. To fully utilize vibrator performance, choose appropriate product for different application.

LUBRICATION

All vibrators require lubricating oil to smooth the operation. Low viscosity oil will be injected into cup of F.R.L. combination unit to adjust required spread oil amount. To aim at specific application requirement, muffler can be applied onto exhaust tube in outside area to prevent food from pollution. Or to inject 2~3 drops of edible oil via air inlet sometimes is an alternative choice. BAH series don't need lubrication unless they are running frequently.

TUBING ARRANGEMENT

Muffler can reduce noise and prevent dust enter the vibrator. The size of tubing should meet with that of vibration air inlet/ exhaust. In the meantime, as two vibrators work simultaneously, length of tubing should be equal after separation. In the meantime, the cross section of tubing should be twice of the vibrator.



VIBRATOR ACCESSORIES

MUFFLER



Muffler is an accessory that decreases noise when air is exhausted from vibrator.

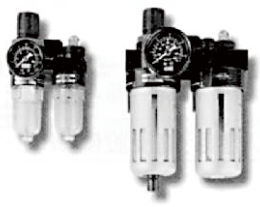
Type \ Model		HP411-AIR006A102	HP411-AIR006A202	HP411-AIR006A402
Range of service pressure		0~9(900) kgf/cm^2 (kpa)		
Range of service temperature		5~60°C		
Material	Body	BRASS		
	Filter Element	BRASS (60mm)		
Orifice	mm^2	17	42	50
Noise elimination effect	dB	1	6	13
Connection port	(PT)	1/8"	1/4"	3/8"

MUFFLER
Material: Plastic



1/8": HP411-AIR006A101
1/4": HP411-AIR006A201
3/8": HP411-AIR006A401

F.R.L COMBINATION (OPTION PART)



Model	Port Size	Lubricator	Regulator	Bracket	Suitable Type				
					BVK	BVR	BVT	BVP	BAH
HP411-AIR008A202	1/4"	√	√	√	10	50	10		30
HP411-AIR008A201	1/4"	√	√	√	13 16 20 25	65 80	13 16 20 25	30 40 60	40 60 80
HP411-AIR008A401	3/8"	√	√	√	32	100	32		

QUICK JOINT (OPTION PART)

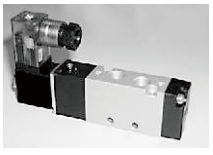


Model	Pu Tube Size	Thread Size
HP411-AIR001A202	OD6xID4	PT 1/4"
HP411-AIR001A201	OD8xID5	PT 1/4"
HP411-AIR001A402	OD12xID8	PT 3/8"

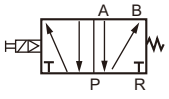
NEW/OLD MODEL NO. COMPARISON TABLE

Old Model No.	New Model No.
26-4000	HP411-AIR006A102
26-4001	HP411-AIR006A202
26-4002	HP411-AIR006A402
AFC-200	HP411-AIR008A202
BFC-200	HP411-AIR008A201
BFC-300	HP411-AIR008A401
SQC 6-02	HP411-AIR001A202
SQC 8-02	HP411-AIR001A201
SQC12-03	HP411-AIR001A402
SV-6102TB	MP509-1EA1300001
SV-8103	MP509-1EA2300002

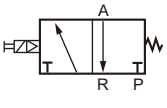
SOLENOID VALVE (OPTION PART)



MP509-1EA1300001



MP509-1EA2300002



Item \ Model	MP509-1EA1300001	MP509-1EA2300002
Fluid	Air	
Pressure Range	1~7Kgf/cm(100~700Kpa)	
Range Of Service Temperature	0~60°C	
Operating Method	Pilot Operate	
Number Of Positions / Ports	2/3	2/5
Valve Functions	Normal Closed	
Orifice	14(0.78) mm^2 (CV)	18(1.0) mm^2 (CV)
Manual Button	Push And Lock	
Connections Port	RT1/4	PT3/8
Lubrication	Lubrication Free Type	

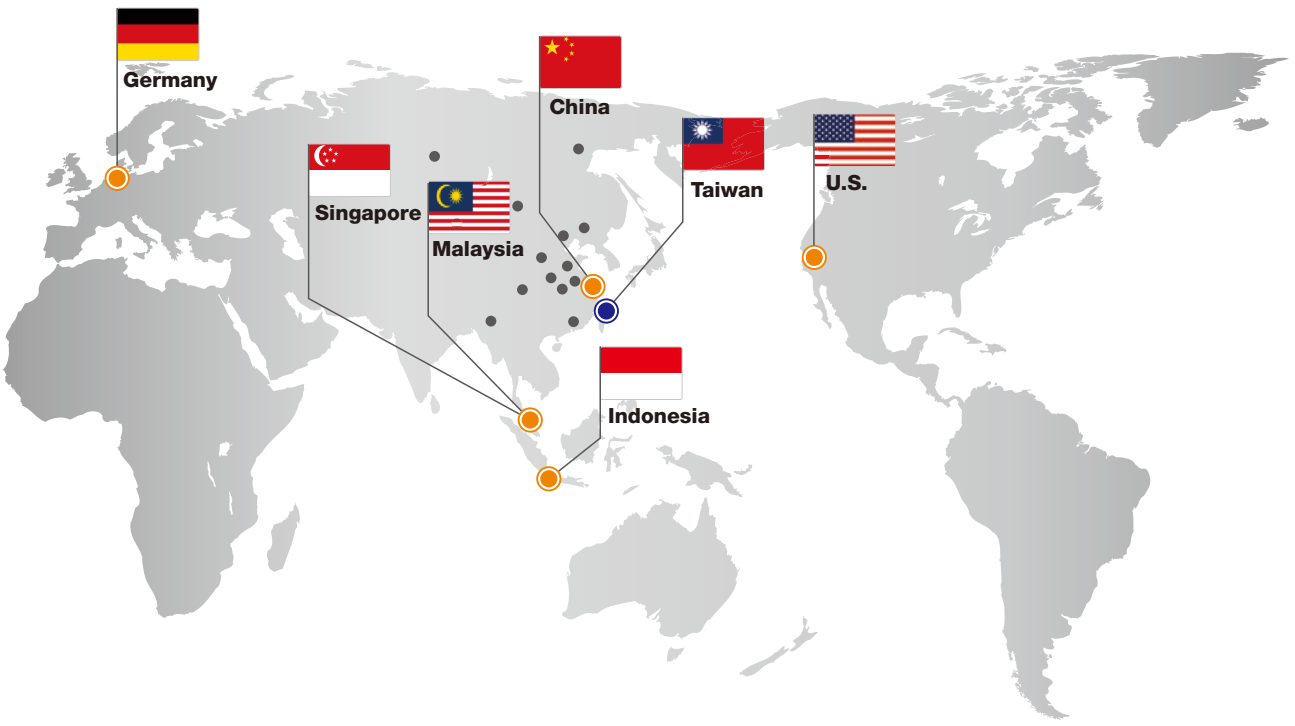
TROUBLE SHOOTING

Air vibrators are simply structured, which seldom breaks down. Break-down usually arose because of careless installation methods.

Pay attention to F.R.L. combination unit after long time operation.

Trouble shooting	Possible factor	Solution
Vibrator cannot run when switch on	No air supply, or low air supply pressure	To check pressure gauge in F.R.L. Unit and air compressor, the air pressure should be adjusted to exceed 5 kg/cm^2 value. Make Sure to turn on the air supply valve and compressor
	Solenoid valve not activated.	To strip air plug of vibrator away, make sure whether air exhaust after solenoid valve is activated
	Exhaust plug of vibrator not being removed	To remove plastic plug of vibrator
	Installation mistake in AC1 series air inlet hole	To make sure air in/outlet installation position is correct.
	HAH can't be operated well due to inapproprate soleuoid valve.	Soleuoid valve has to be 3/2 ways type, otherwise BAH will not be able to exhaust after operating.
Too small vibration force	Install manifold or too many branches on main tube with same cross section size	To enlarge cross section of main tube equal or bigger than sum of manifold or branches tubes. or to install tubings individually
	Insufficient air supply, Inappropriate tube, solenoid valve, F.R.L unit , or tubing is too long	To make sure applied accessories match to required ones, the length of tubing should not go beyond 5M.
	Wrong VT exhaust and inlet installation	To check pressure of F.R.L. unit and adjust its value higher
	Articles are absorbed by the vibrator	To dismantle the vibrator for checking
	Objects jam in muffler	To check pressure of air supply and adjust it stronger
Vibration noise	Screw loosen	To tight the screws
	U shape steel is not welded well	To weld again
	Vibrators problem	To remove vibrator, then activate it individually. It has to be repaired, if abnormal condition happened while running.
Solenoid valve noise	Articles are in solenoid valve	To replace solenoid valve

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FEED TEC D.O.O.

Svetogorska 22/V, 11103 Beograd, Srbija
TEL: +381-11-3240-422 FAX: +381-11-3244-364
e-mail: office@feedtec.rs http://www.feedtec.rs

08-BAV-EP, 05/15/2018