NetterVibration

CE

Assembly and Operating Instructions Oct. 2014
Netter Vacuum-Fixing-Devices BA Nr. 1555E
Page 1/24

These operating instructions apply for:

VAC 8	**VAC 13**
VAC 10	**VAC 15**
VAC 11	**VAC 20**
VAC 12	**VAC 30**
	VAC 40

Serving industry with vibration

Netter GmbH
www.*Netter*Vibration.com

Germany
Fritz-Ullmann-Straße 9
55252 Mainz-Kastel
Tel. +49 6134 2901-0
info@*Netter*Vibration.de

Poland
Al. W. Korfantego 195/17
40-153 Katowice
Tel. +48 32 2050947
info@*Netter*Vibration.pl

Switzerland
Erlenweg 4
4310 Rheinfelden
Tel. +41 61 8316200
info@*Netter*Vibration.ch

Spain
Errota Kalea 8
20150 Villabona-Guipúzcoa
Tel. +34 943 694 994
info@*Netter*Vibration.es

Table of Contents

Scope of delivery

The VAC are delivered with the following components as standard:

- Vacuum fixing device (VAC)
- Operating instructions
- Packaging
- From series VAC 11 safety rope

For changes to the scope of delivery please refer to the delivery note.

Check the packaging for possible signs of transport damage. In the event of damage to the packaging, check that the contents are complete and undamaged. If there is any damage, inform the shipping agent. Compare the scope of the delivery with the delivery note.

1 General notes

Information on the operating instructions

Use and storage of the operating instructions

Before use of the Vacuum fixing device of the series VAC read this operating manual carefully. It is the basis for any action taken with regard to the VAC and may be used for training purposes. The operating manual should subsequently be stored near the VAC.

Target group

The target group of these operating instructions is qualified technical personnel from the mechanical engineering sector who have a basic knowledge of pneumatics and mechanics.
Installation, commissioning, maintenance, fault elimination and disassembly of the VAC must only be performed by persons who have been instructed in the proper handling of the units.
Persons who have not been instructed accordingly must not carry out any works on the VAC.

Copyright

Limitation of liability

All technical information, data and instructions on installation, operation and maintenance in these operating instructions are based on the latest information available at the time of printing and take into account our past experience to the best of our knowledge.
No claims can be derived from the information, illustrations and descriptions in these operating instructions.

The manufacturer does not assume liability for damages resulting from:

- failure to observe the operating instructions
- improper use
- unauthorized repairs
- technical modifications
- use of inadmissible spare parts

Translations are made to the best knowledge. ***Netter****Vibration* does not assume liability for translation errors, even if the translation was made by us or on our behalf. Only the original German version is binding.

The following instruction and warning symbols are used in these operating instructions.

	**DANGER**	referring to a possible risk, which, if not avoided, can result in death or serious injury.
	**CAUTION**	referring to a possible risk, which, if not avoided, can result in serious injury and/or equipment damage.
	**IMPORTANT**	note with especially useful information and tips.
	**ENVIRONMENTALLY FRIENDLY DISPOSAL**	refers to the obligation of an environmentally friendly disposal

Information on the VAC

Netter vacuum fixing devices of series VAC for pneumatic vibrators are in strict compliance with the EC Machine Directive 2006/42/EC. The standard DIN EN 12100 has been observed in particular.

Special features

- Quick mounting without bolting or welding
- Strong connection due to high vacuum
- Can also be used on curved and uneven surfaces
- optional air economizer

2 Safety

Designated use:
Vacuum fixing devices of series VAC are used for quick fastening of vibrators to smooth and, to a limited extent, also to rough and curved surfaces.
They are used in combination with vibrators for the emptying of transport containers or drums, for the cleaning of pipes etc.
Vacuum fixing devices are used where conventional fastening methods for vibrators fail, frequent relocation of vibrators is required and welding or bolting is not possible.
Any other use is considered improper use.
There are no built-in safety devices.

Qualification of the personnel:
Assembly, start up, maintenance and repair of the impactors must be performed only by authorized qualified personnel.
Any handling of the pneumatic impactors lies within the responsibility of the operator.

Accessories which ensure the correct operation and safety must provide a protection type required for the specific use.

CAUTION

Netter*Vibration* **does not assume liability for damage or injury resulting from technical modifications to the product or failure to observe the instructions and warnings in this operating manual.**

CAUTION

Not every pneumatic vibrator is suitable to the vacuum fixing device. Applicable vibrators are listed in chapter 6 „Mounting of vibrator and hose set“.

When choosing a different vibrator a preceding consultation is required.

DANGER

Source of danger:
In case of an unexpected pressure drop the vacuum fixing devices may come loose.

Possible consequences of non-observance:
A fixing device dropping down can cause bodily injury and/or damage to property.

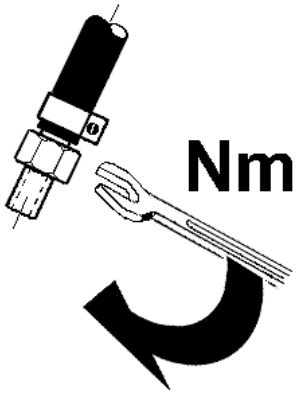
Avoiding the danger:
The vacuum fixing devices VAC 8 and VAC 10 are by customer secured against drop down.
From series VAC 11 the vacuum fixing devices are fitted with an adjustable safety rope. This rope must be pre-tensioned as short as possible using a bulldog grip. Should a vacuum fixing device come loose it should never drop into a slack rope.

DANGER

Source of danger:
Faulty hose connections.

Possible consequences of non-observance:
A pressurized hose coming loose can cause severe injury.

Avoiding the danger:
The hose lines must be securely connected. This must be checked at regular intervals and the screw connections have to be retightened if necessary.

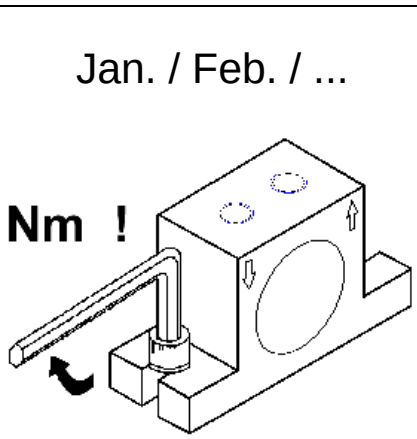


DANGER

Source of danger:
Vibrators bolted to vacuum fixing devices may come loose by the effect of vibration.

Possible consequences of non-observance:
Falling parts can cause damage to persons and material.

Avoiding the danger:
Screw retention components and/or Loctite or similar must be used. Screw connections must be checked and, if necessary, retightened after 1 hour of operation and then at regular intervals (normally every month).

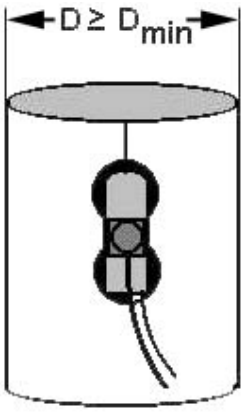


DANGER

Source of danger:
With parts of smaller cross section there is a risk that a vacuum fixing device may come loose.

Possible consequences of non-observance:
A fixing device dropping down can cause bodily injury and/or damage to property.

Avoiding the danger:
The vacuum fixing device must not be mounted on round components, which have a smaller diameter than permitted in chapter 3 “Technical data“.



CAUTION

Source of danger:
In the vicinity of the VAC 13-40 the noise level can exceed 80 dB(A).

Possible consequences of non-observance:
Human hearing can be permanently damaged by the high noise level.

Avoiding the danger:
When working in the noise area, ear defenders are required if the sound level exceeds 80 dB(A).

3 Technical data

Type	Generated vacuum [bar]		Generated suction power* [N]		Weight [kg]	Air consumption [l/min]		Noise level** [dB(A)]		recommended minimum diameter for round containers [mm]
	4 bar	6 bar	4 bar	6 bar		4 bar	6 bar	4 bar	6 bar	
VAC 8 + HG 10 N	0,60	0,85	340	481	0,95	40	60	68	75	110
VAC 8 + HG 10 S	0,60	0,85	340	481	1,20	20	22	68	75	110
VAC 10 + HG 10 N	0,60	0,85	465	658	1,05	40	60	68	75	110
VAC 10 + HG 10 S	0,60	0,85	465	658	1,30	20	22	68	75	110
VAC 11 + HG 10 N	0,60	0,85	710	1.005	1,25	40	60	74	78	110
VAC 11 + HG 10 S	0,60	0,85	710	1.005	1,50	20	22	74	78	110
VAC 12 + HG 15 N	0,60	0,85	1.250	1.770	2,85	60	122	64	79	350
VAC 12 + HG 15 S	0,60	0,85	1.250	1.770	3,20	29	36	64	79	350
VAC 13 + HG 15 N	0,60	0,85	1.362	1.930	4,20	110	170	83	77	850
VAC 13 + HG 15 S	0,60	0,85	1.362	1.930	4,55	41	52	83	77	850
VAC 15 + HG 15 N	0,60	0,85	1.476	2.091	3,40	110	170	83	89	650
VAC 15 + HG 15 S	0,60	0,85	1.476	2.091	3,75	41	52	83	89	650
VAC 20 + HG 15 N	0,60	0,85	2.724	3.859	7,25	110	170	79	79	850
VAC 20 + HG 15 S	0,60	0,85	2.724	3.859	7,60	41	52	79	79	850
VAC 30 + HG 30 N	0,60	0,85	4.086	5.789	11,50	110	170	79	79	1.500
VAC 30 + HG 30 S	0,60	0,85	4.086	5.789	12,00	49	60	79	79	1.500
VAC 40 + HG 40 N	0,60	0,85	5.448	7.718	20,00	220	340	82	86	1.500

* Maximum suction power at 5 bar. For operation of a vibrator a higher pressure may be required.
**The noise level was measured at a distance of 1 m without vibrator. The noise level of vibrators may be higher.

Admissible operating conditions

Drive medium
Clean (Filter ≤ 5 µm, quality class 3 according to DIN ISO 8573-1), compressed air or nitrogen.

Unfiltered air will cause damage to the mounted vibrators.

Lubrication
VAC fixing devices do not require lubrication.

IMPORTANT

For the mounted vibrator lubricated compressed air may be specified. Please refer to the corresponding operating instructions for the vibrator.

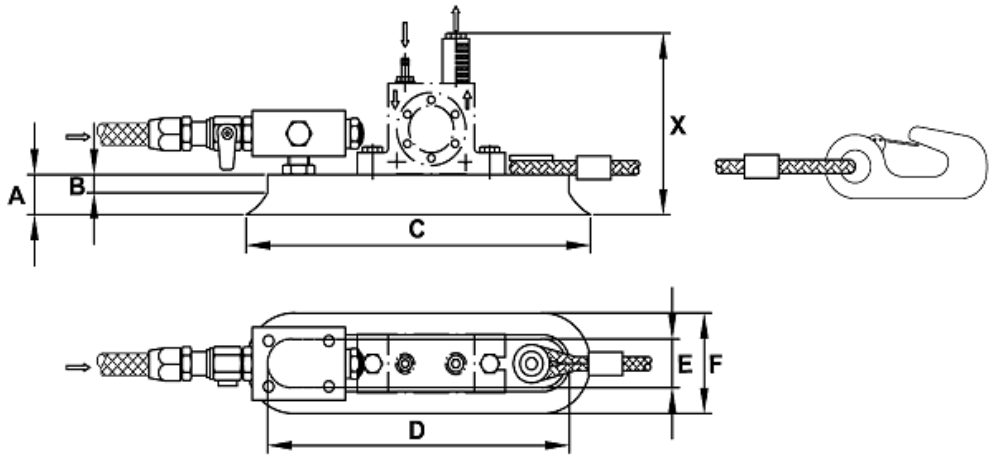
Operating pressure
4 bar to 6 bar*
Operating pressures must not be exceeded or fall short of.

Ambient temperature
-10°C to 60°C
The admissible ambient temperatures must not be exceeded or fallen short of during operation.

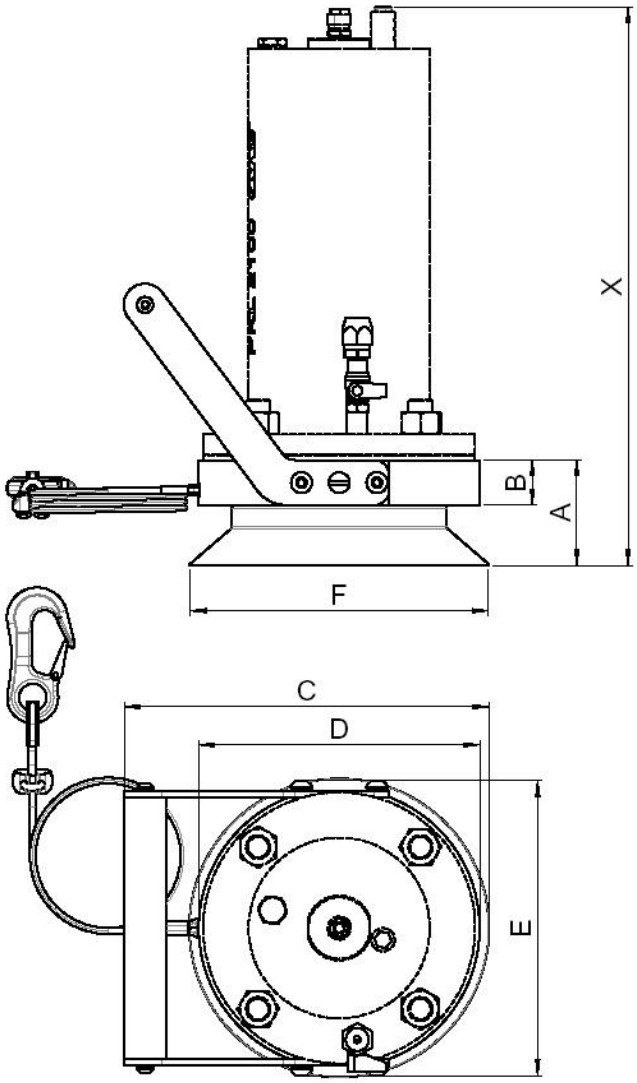
*) Higher operating pressures and temperatures are only permitted after consultation and written confirmation by application engineers of ***Netter****Vibration*.

Dimensions:

VAC 8 / VAC 10 / VAC 11 / VAC 12



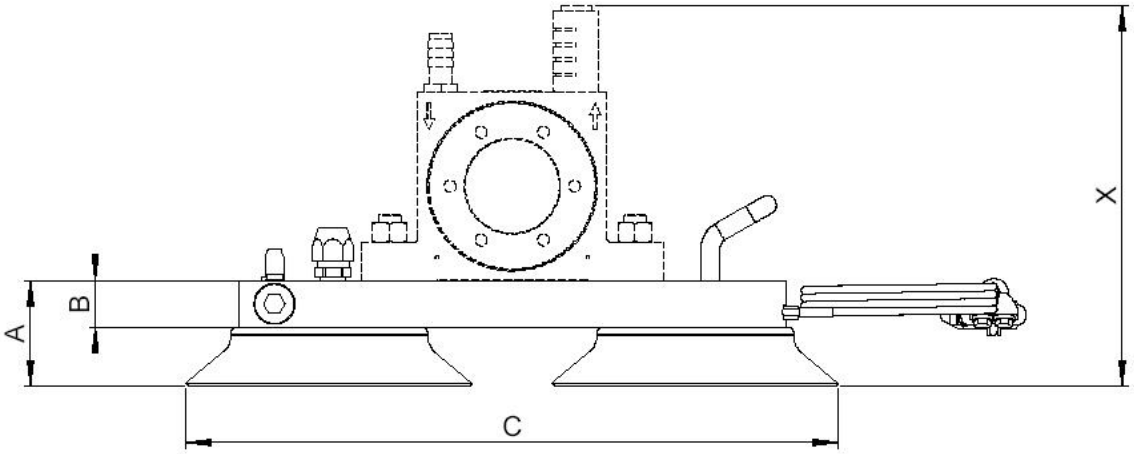
VAC 13

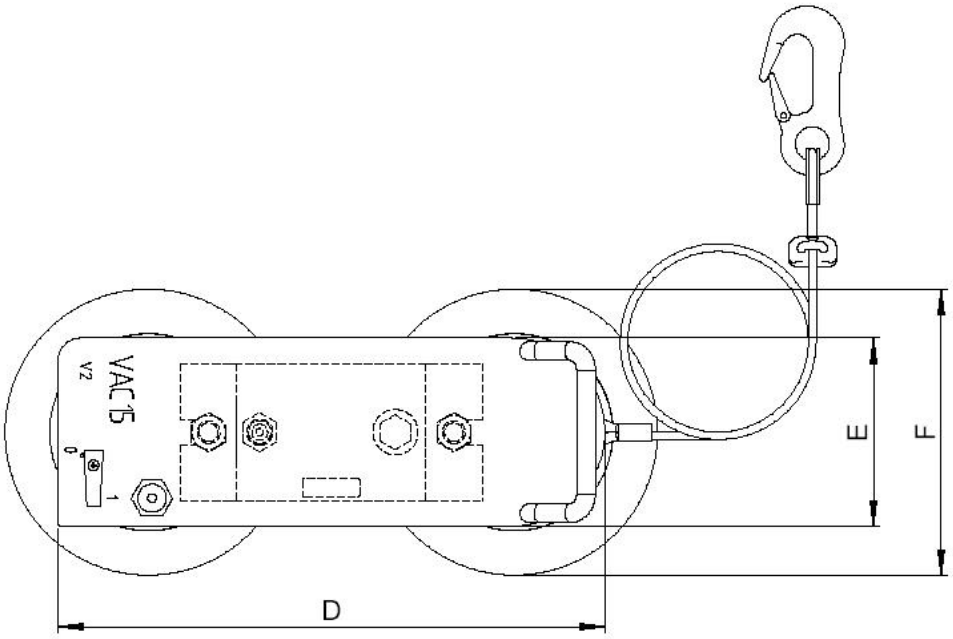


Type	A	B	C	D	E	F
VAC 8	19	8	150	127	30	55
VAC 10	22	8	200	175	26,5	55
VAC 11	20	5,5	300	276	26	55
VAC 12	25	10	300	268	68	100
VAC 13	70	30	186	241	195	197

All dimensions in [mm] - measurement X depending on vibrator

VAC 15 / VAC 20

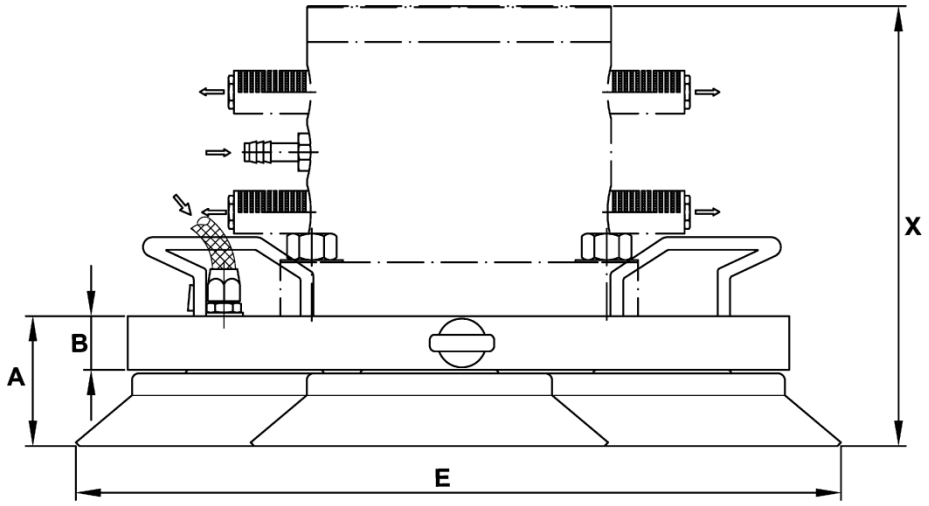


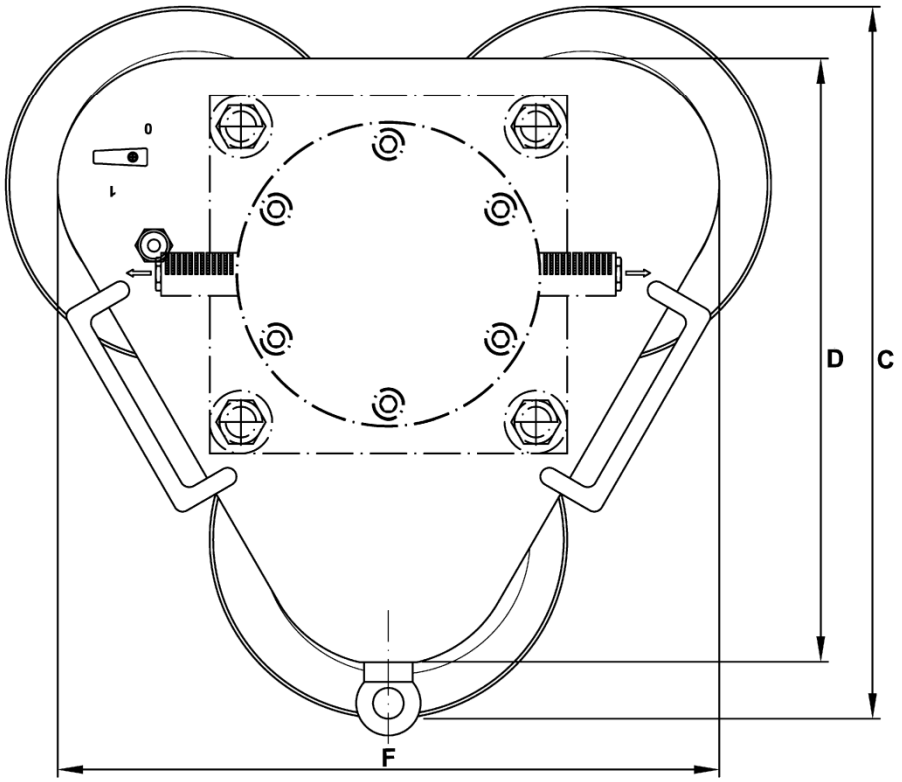


Type	A	B	C	D	E	F
VAC 15	50	25	345	290	100	150
VAC 20	70	30	425	370	150	200

All dimensions in [mm] - measurement X depending on vibrator

VAC 30

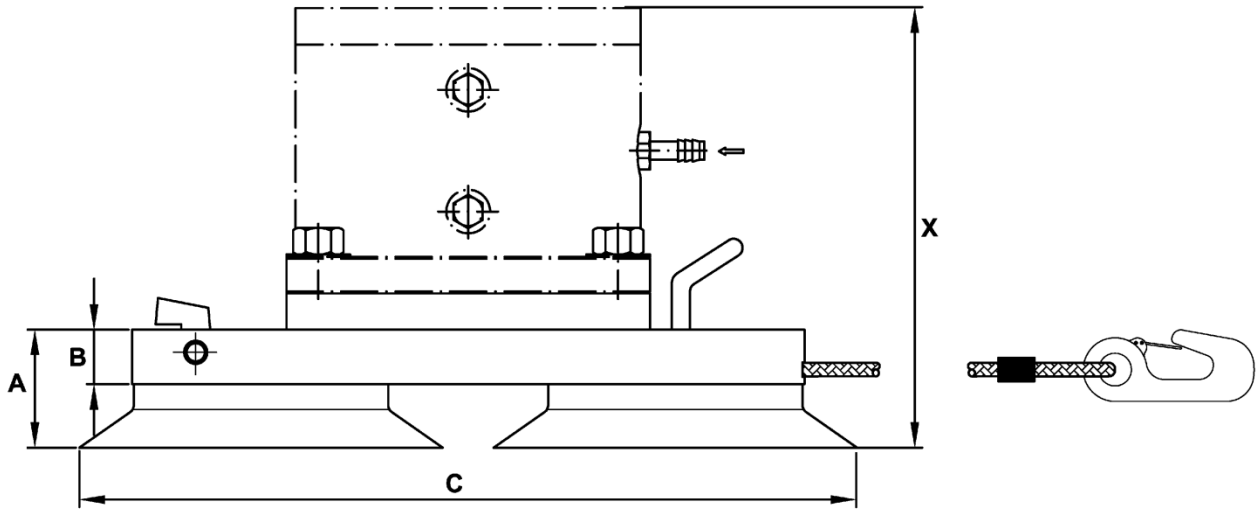


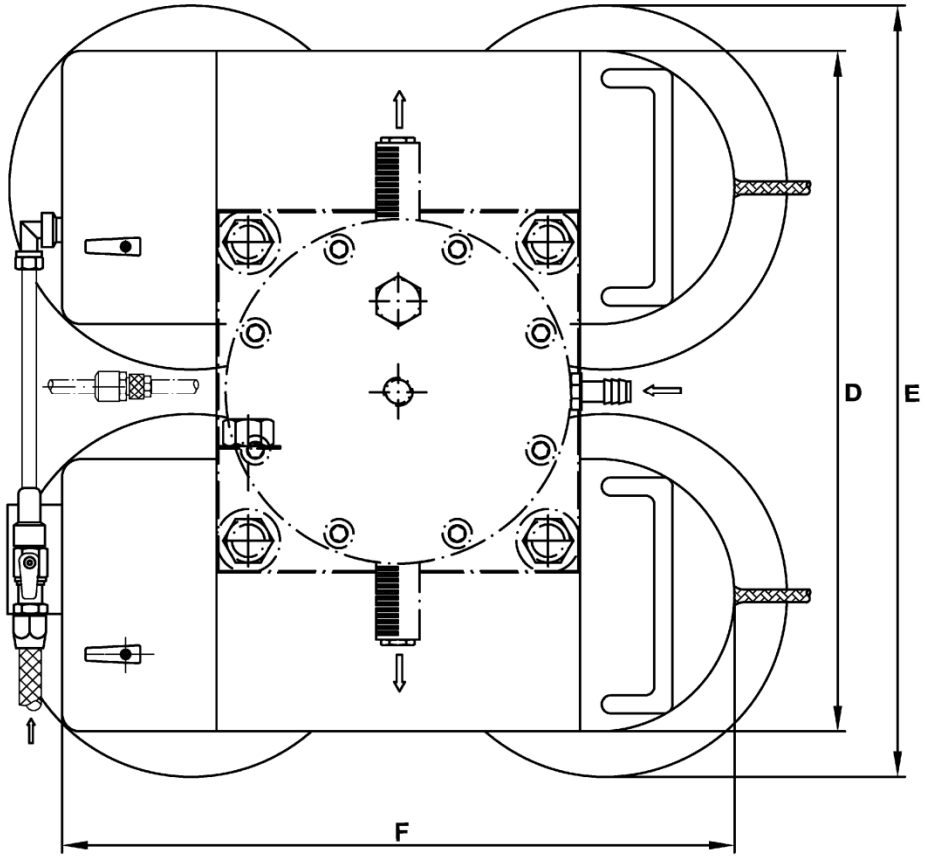


Type	A	B	C	D	E	F
VAC 30	70	30	396	339	426	370

All dimensions in [mm] - measurement X depending on vibrator

VAC 40





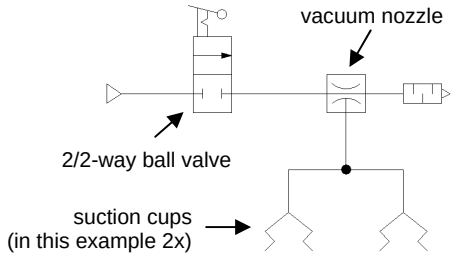
Type	A	B	C	D	E	F
VAC 40	70	25	426	375,5	425	370

All dimensions in [mm] - measurement X depending on vibrator

4 Design and Functioning

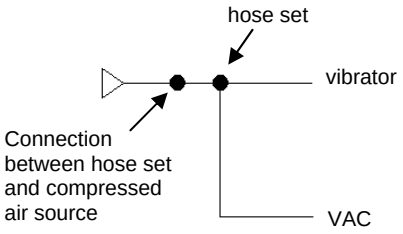
Vacuum fixing device

A vacuum fixing device mainly consists of a base plate, a 2/2-way ball valve, a vacuum nozzle and suction cups. When operating the 2/2-way ball valve the vacuum nozzle generates a vacuum. By this the suction cups of the vacuum fixing device adheres to the mounting surface by suction.



Functional unit

Hose set, vacuum fixing device and vibrator together form a functional unit. The vibrator is tightly bolted to the vacuum fixing device. Vibrator and vacuum fixing device are supplied with the necessary energy (compressed air or nitrogen) through the hose set.

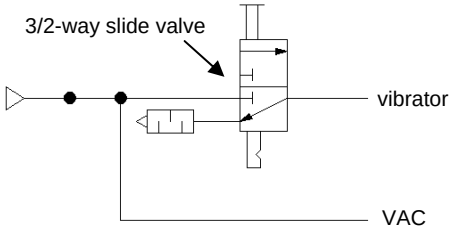


The hose set is normally available in two different designs:
Hose set "Standard" HG .. N and hose set "Economy Air Supply" HG .. S:

Hose set HG ... N

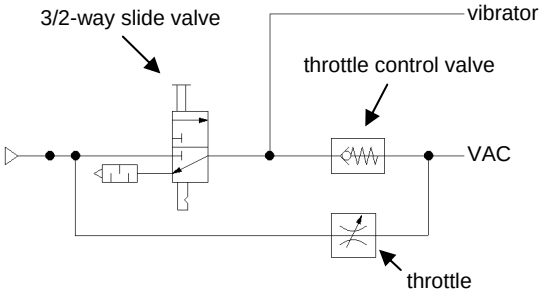
The vacuum fixing device (opened main valve - customer) will always be under pressure, when the pressure is applied.

The vibrator is switched on and off by actuation of the manually operated 3/2-way slide valve.



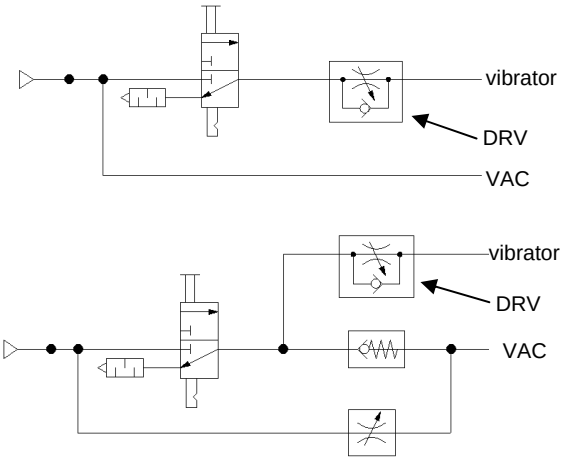
Hose set HG ... S

In addition to the standard function (see hose set "Standard" HG .. N) the hose set „Economy Air Supply“ HG .. S has an economy switch position. With the vibrator switched off the compressed air consumption can be reduced by approx. 30% in comparison to the standard version by means of a throttle. This compressed air reduction makes sense, because the "holding function" does not require the totally available compressed air. The totally available compressed air is only needed for operation of the vibrator.



Hose set HG with throttle control valve

Both versions of the hose-sets (N and S) are available with throttle control valve (DRV) and recommended by ***Netter****Vibration*.
Means of this valve, the pressure which is applied to the vibrator may be adjusted. Thus, there is the possibility of the speed of the vibrator and the impact frequency of the vibrator to adjust.



5 Transport and Storage

IMPORTANT

Check the packaging for possible signs of transport damage. In the event of damage to the packaging, check that the contents are complete and undamaged. If there is any damage, inform the shipping agent.

Packaging

The vacuum fixing devices are packaged ready for commissioning. The type designation is stamped (8 VAC, VAC 10, VAC 11, VAC 12 and VAC 13) or engraved (VAC 15 VAC 20 VAC 30 and VAC 40) on the base plate.
When ordering a vacuum fixing device with hose set and vibrator these components are completely assembled, unless otherwise agreed. Special transport conditions are not prescribed.

The packaging protects the unit from transport damages. The packaging materials have been selected on an environmental and disposal-friendly basis and are therefore recyclable.
Recycling packagings reduces raw material consumption and waste volume.

Storage

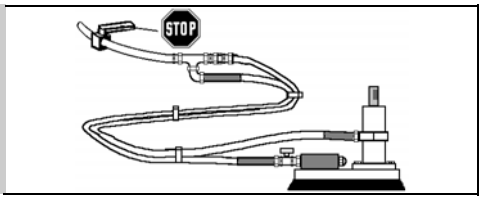
Protect the vacuum fixing devices from excessive exposure to UV radiation, weathering and ozone.
The vacuum fixing devices should be stored in boxes in a dry and clean environment. When restocking all openings must be closed.

The storage temperature should be between -10 and +25°C. (This does not apply to the operating temperature).
After 4 years of storage all plastic and silicone components must be replaced before using.

6 Installation

CAUTION

Make sure the compressed air supply is switched off during installation or any other work on vacuum fixing devices, vibrator or air supply lines.



Complete vacuum fixing devices with hose set and vibrator are directly ready for operation after connection to compressed air.

If ordered separately, hose set and vibrator must first be assembled.
.

The following vibrators can be mounted to the vacuum fixing devices:

Type	Suitable vibrators						
	NCB	**NCR**	**NCT**	**NTK**	**NTS**	**NTP**	**PKL**
VAC 8 +HG 10 N	1, 2		1, 2	8AL,15X, 16, 18AL	120 HF, 120 NF*	25**	
VAC 8 +HG 10 S					180 HF, 180 NF*		
VAC10+HG 10 N	1, 2, 3	3	3, 4	15X, 18AL	180 HF, 180 NF*	25**	190**
VAC10+HG 10 S					250 HF, 250 NF*		
VAC11+HG 10 N	3, 5	10	5, 10	18AL	180 HF, 180 NF		190**
VAC11+HG 10 S					250 HF, 250 NF		450**
VAC12+HG 15 N	10, 20	22	15, 29	25AL	350 HF, 350 NF	25**, 32**, 48**	450**
VAC12+HG 15 S					100/01, 75/01**, 50/01**		740**
VAC13+HG 15 N	10, 20	22	15, 29		75/01, 50/01, 70/02*	32**	740, 2100 5000
VAC13+HG 15 S							
VAC15+HG 15 N	10, 20	22	15, 29	18AL, 25	250 HF,250 NF,350 HF,350 NF	32, 48*	740
VAC15+HG 15 S	50, 70	57*	55, 108*		75/01, 50/01, 70/02*		
VAC20+HG 15 N		57	55, 108		70/02, 54/02, 50/04*	32, 48	2100 5000
VAC20+HG 15 S							
VAC30+HG 30 N		120	126, 250		50/04, 50/08*	**NVG** 49, 55, 61	5000
VAC30+HG 30 S						**NVG** 82, 84*	
VAC40+HG 40 N					50/08*, 50 /10*		

*Depending on application, please consult ***Netter****Vibration*. ** Adapter plate required, please add to your order!

DANGER

Not every pneumatic vibrator is suitable for the vacuum fixing device. With drill patterns different to the ones for the above listed units the internal pilot bores may be damaged. The above mentioned combinations (fixing device/vibrator) have been tested and can be used without any limitations.

When choosing a different vibrator a prior consultation is required.

Use screw retentions and nuts to fasten the vibrator. Use a liquid screw retention agent (e.g. Loctite) against loosening. (If you use a VAC with a PKL, it must be mounted with the prescribed NBS fixing kit!)
Use tightening torques according to the following table.

Higher tightening torques may cause fracture of screws or tearing of threads. Inadequate screw connections may cause loosening of units by vibration.

This can cause damage to persons and material!

Recommended mean tightening torques for screws of quality 8.8 (screws as supplied, without additional lubrication):

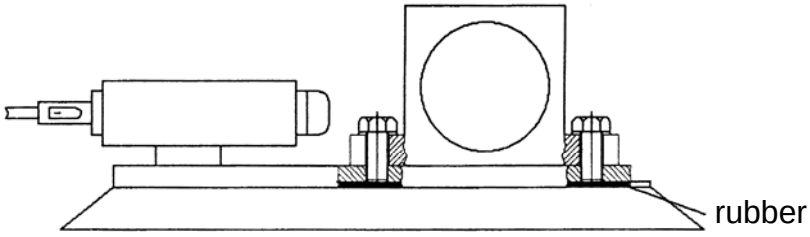
Thread	Tightening torque [Nm]
M 6	10
M 8	23
M 10	48

Thread	Tightening torque [Nm]
M 12	80
M 16	190
M 20	380

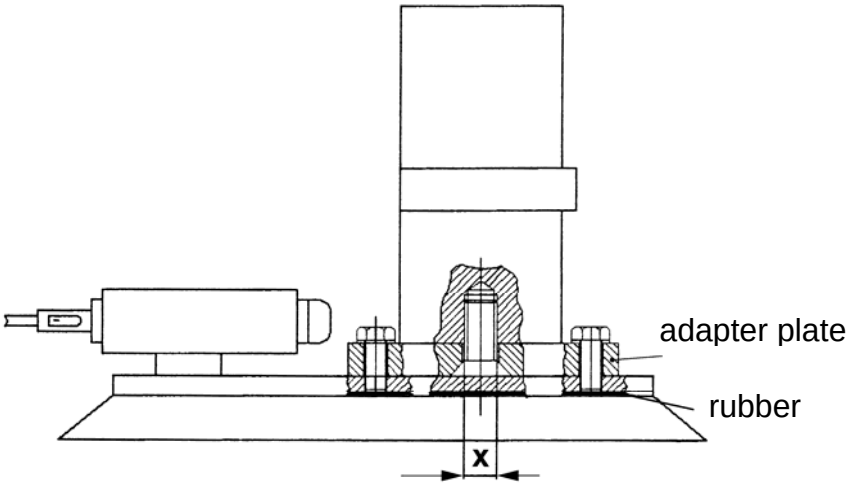
IMPORTANT Vibrators must be cautiously and properly fastened. The fastening screws for the vibrator must be retightened or checked after 1 operating hour.

VAC 8, VAC 10, VAC 11 and VAC 12
Installation of the Vibrator:

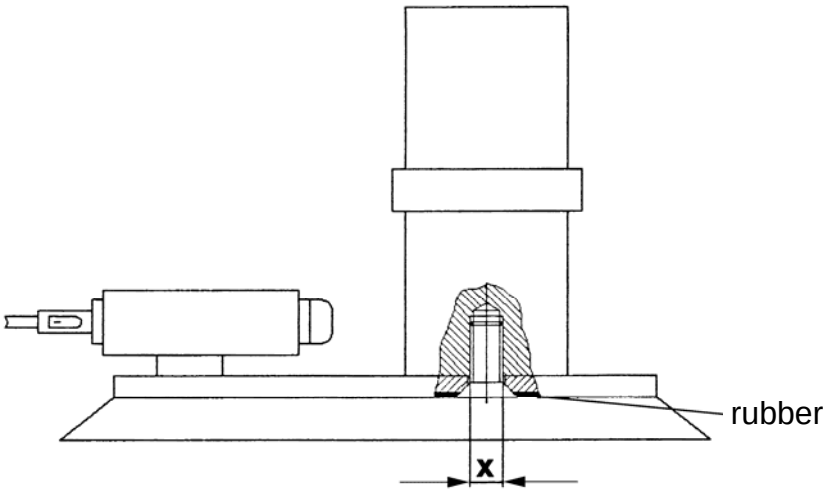
In order to mount vibrators NCT two tapped blind holes must be drilled.



If a compressed air operated piston vibrator of series NTS or NTK is to be mounted, we recommend the use of an adapter plate.



Alternatively one hole must be drilled into the suction cup and the tapped hole sealed with a suitable sealing agent.
For the size **X** refer to the operating instructions for the respective vibrator.



IMPORTANT When drilling blind holes make sure not to drill through the suction cup (rubber). However, if this should happen, you must seal the tapped holes with a suitable sealing agent, as otherwise no vacuum can be generated.

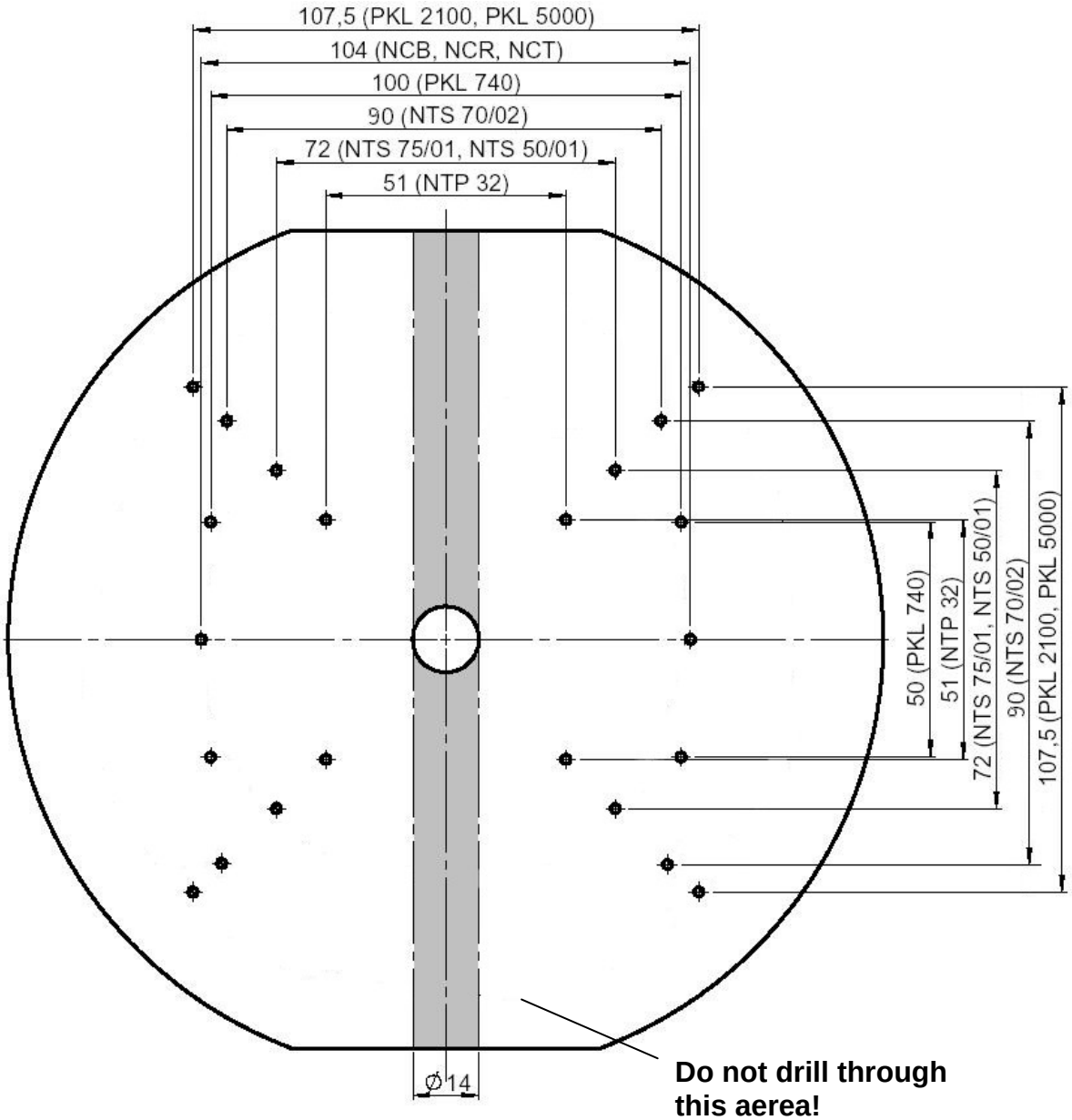
VAC 13, VAC 15, VAC 20, VAC 30 and VAC 40
Installation of the Vibrator:

In order to mount the vibrator to a VAC 13, VAC 15 or VAC 20 socket head cap screws acc. to DIN 7991 are required. The assembly can be performed as follows:

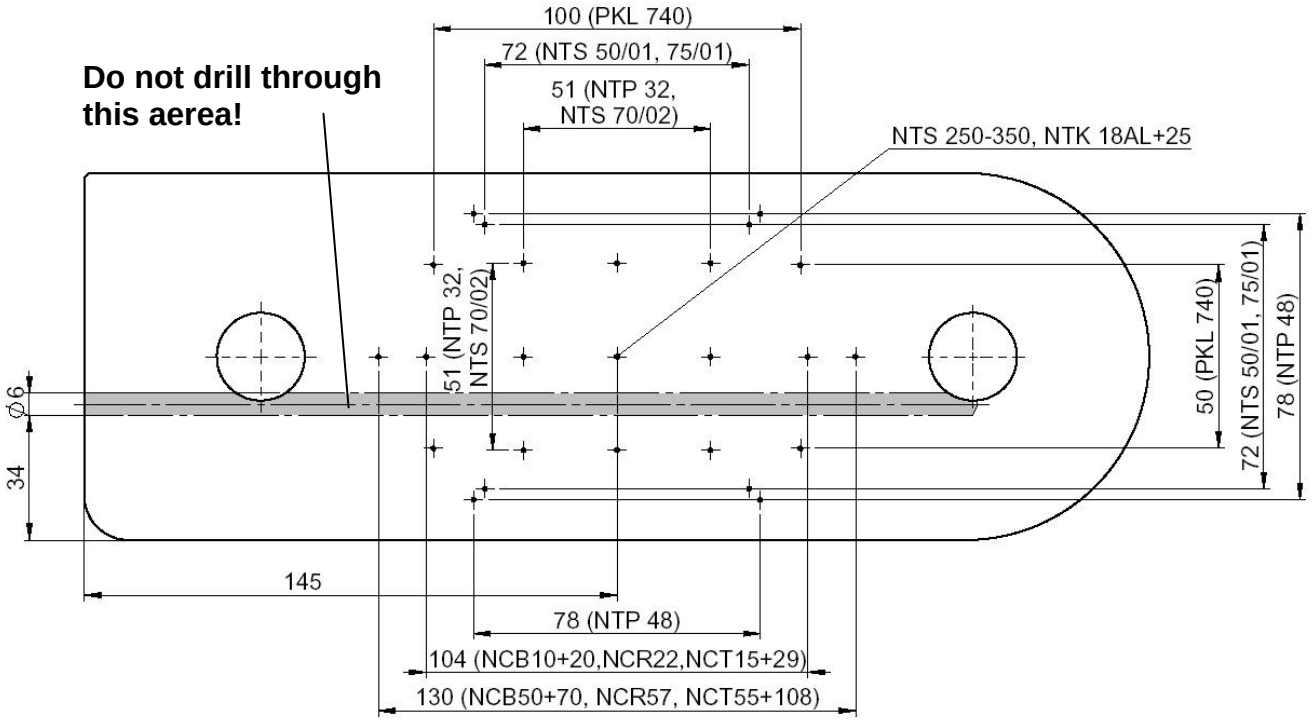
1. Unscrew the suction cups.
2. Determine and mark the necessary bore holes (commonly used bore pitches have already been marked with a centre punch, see template VAC 15 and VAC 20).
3. Drill through-holes (diameter depending on type of vibrator - see operating instructions for vibrator).
   Countersink bores from bottom side of base plate (side of suction cup) acc. to DIN 74-Bf....
4. Fasten the vibrator using the specified socket head cap screws. For this purpose use common screw retentions.
5. Assemble the suction cups in the correct position.

IMPORTANT For assembly of the PKL 740 to the VAC 15 an adapter plate is required, if the inlay EE is not used.

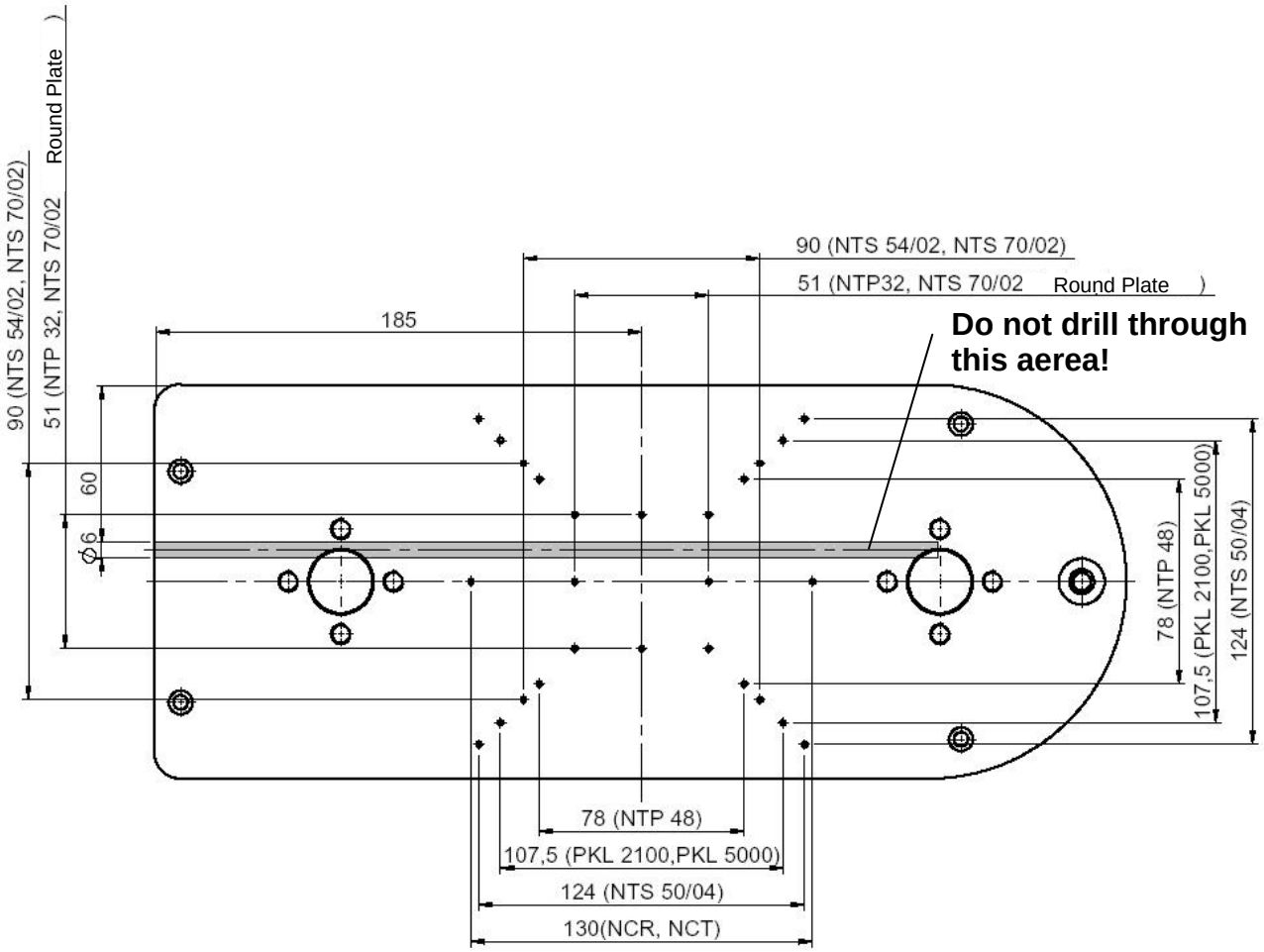
Template VAC 13



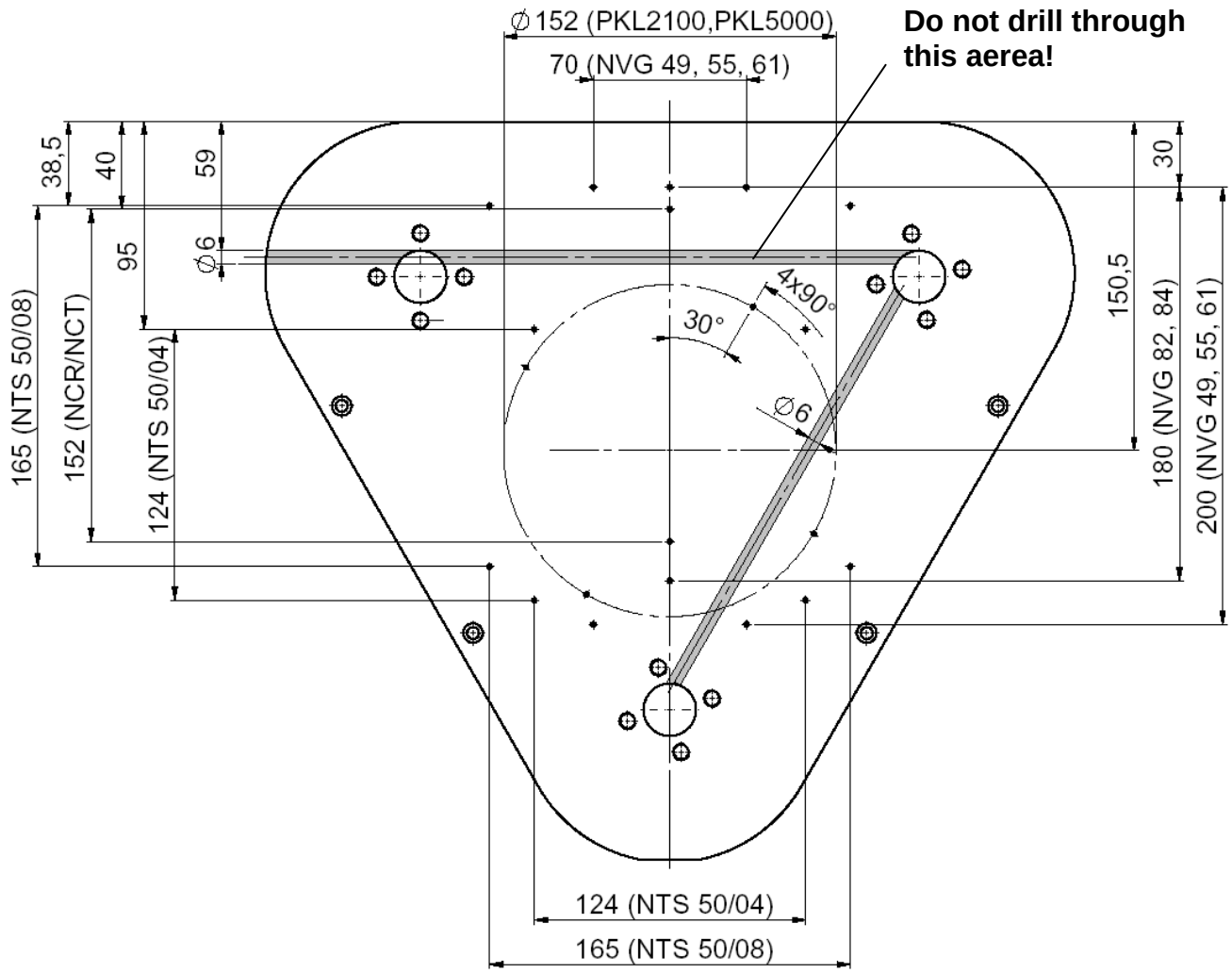
Template VAC 15



Template VAC 20



Template VAC 30



VAC 40

Installation of the Vibrator:

The VAC 40 consists of two VAC 20, which are connected by an adapter plate. The vibrator is mounted to the adapter plate. For the fastening of a compressed air operated piston vibrator series NTS 50/10 the adapter plate has four through holes. For the fastening of any other vibrator you should consult ***Netter****Vibration* beforehand.

Installation of the VAC on the lifting device

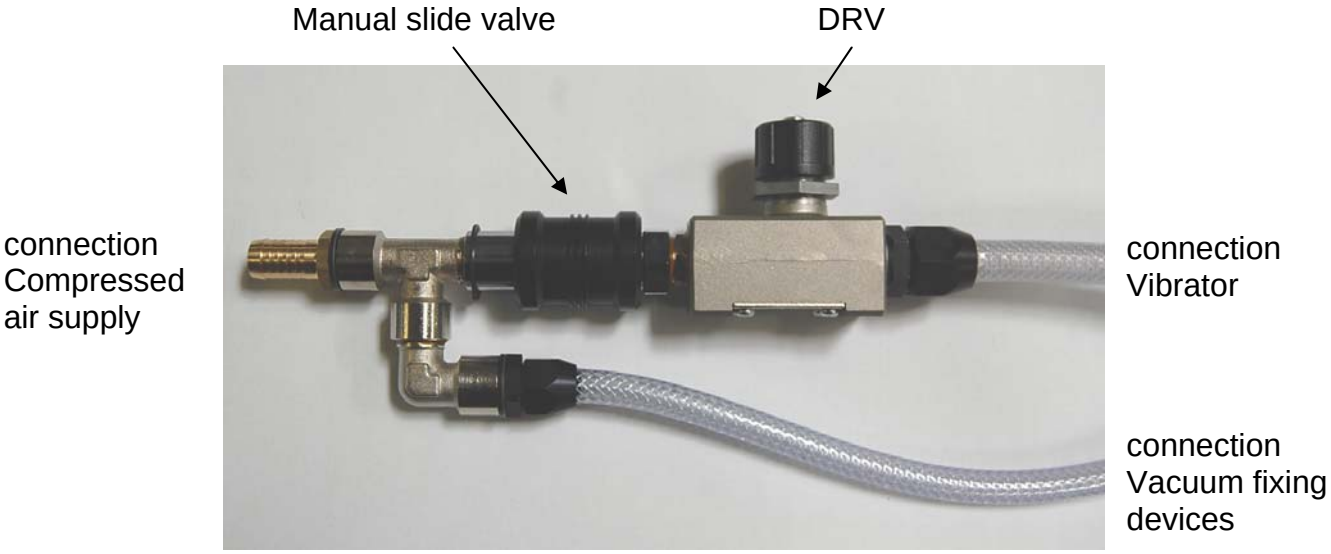
Due to its own weight, the vacuum fixing device may only be lifted with suitable lifting device. When lifting the vacuum fixing device an eyebolt M16 is available.

Vacuum fixing devices should be used in combination with the following hose sets:

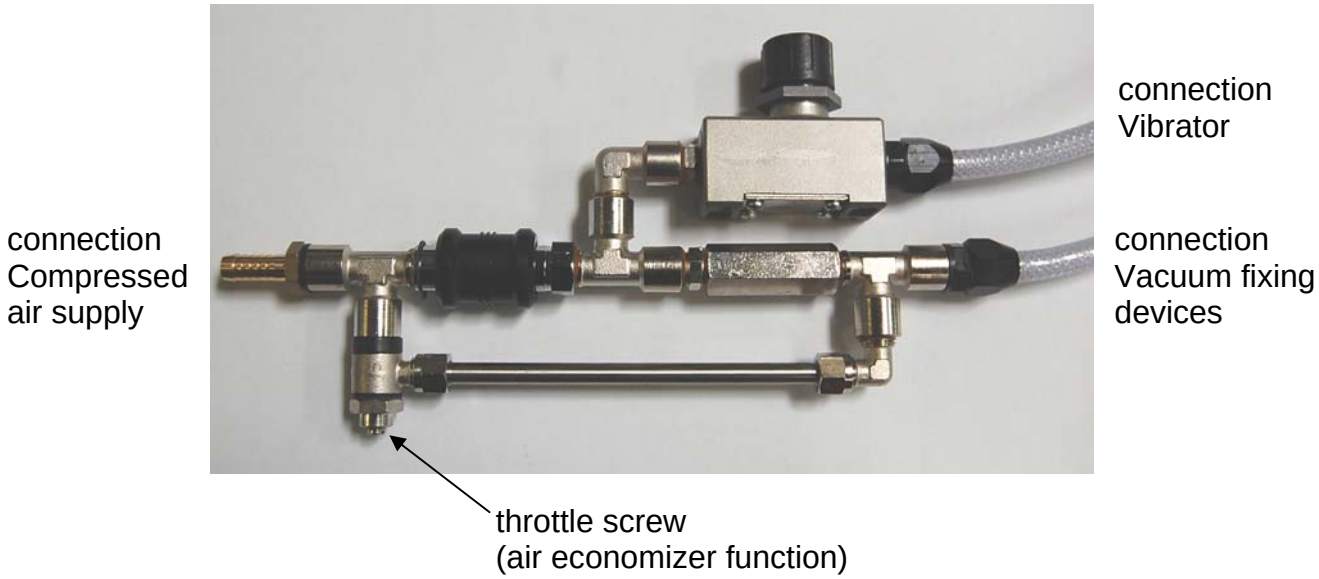
Type	Hose set (except PKL)	Hose set for PKL
VAC 8	HG 10 N or HG 10 S	
VAC 10	HG 10 N or HG 10 S	
VAC 11	HG 10 N or HG 10 S	HG 10 N or HG 10 S
VAC 12	HG 15 N or HG 15 S	HG 10 N or HG 10 S
VAC 13	HG 15 N or HG 15 S	HG 10 N or HG 10 S
VAC 15	HG 15 N or HG 15 S	HG 10 N or HG 10 S
VAC 20	HG 15 N or HG 15 S	HG 10 N or HG 10 S
VAC 30	HG 30 N or HG 30 S	HG 10 N or HG 10 S
VAC 40	HG 40 N	

Throttle control valves (DRV) are recommended for use of a hose set.

Example of Hose set HG N with DRV



Example of Hose set HG S with DRV



Connection of power supply

Supply line:

The pressure loss increases with the hose length. The following recommendations refer to hose lengths of max. 3 m to the next bigger hose cross section. For longer supply lines we recommend the use of bigger cross-sections, whereby the supplied hose socket can no longer be used.

Minimum cross-sections for hoses

CAUTION

A too small cross-section does not enable a sufficient vacuum.

Type	Hose socket	Hose size
HG 10 N / S	1/4“	NW 6
HG 15 N / S	3/8“	NW 9
HG 30 N / S	1/2“	NW 12
HG 40 N	1/2“	NW 12

Safeguard with safety rope

DANGER

Before mounting locate a secure attachment point (e.g. an eye bolt) where you can hook the safety rope of the vacuum fixing device to attach it on your container or your construction.

This rope must be pre-tensioned as short as possible by using a rope clamp.

Should a vacuum fixing device come loose it must not drop into a slack rope.

Checklist for installation:

1) Install the vibrator. Mounting screws secure.
2) Install hose set.
3) Install maintenance unit (filter, regulator and lubricator possibly) and valve.
4) Lock the fastening screws with glue (e.g. Loctite).
5) Glue the air supply lines.
6) Observe the information on hose length and diameter.
7) Connect safety cable!

7 Start-up / operation

After assembly is complete, the VAC is ready for commissioning. The vacuum fixing devices can be operated with filtered compressed air or nitrogen. For the operation of certain vibrators an lubricated drive medium is prescribed. More details can be found in the operating instructions for the respective vibrators.

DANGER

In case of an unexpected pressure drop the vacuum fixing devices may come loose. Therefore, they always have to be secured against falling down.

For VAC 8 and VAC 10 additional adapter plates and safety ropes are available.

From series VAC 11 the vacuum fixing devices are fitted with an adjustable safety rope.

Handling:

First secure the vacuum fixing device against falling down. Then check the hose connections and close all valves. Turn on the compressed air supply for the vacuum fixing device and the vibrator. Then position the vacuum fixing device to the desired location and actuate the 2/2-way ball valve on the vacuum fixing device to generate the required vacuum under the suction cup.

Check the vacuum fixing device for tight and secure attachment.

If the fixing device can be loosened by hand, you should increase the pressure (e.g. on maintenance unit with pressure regulator).

Then start the vibrator by actuating the manual 3/2-way slide valve on the hose set and adjust the lubricator.

Adjust the desired vibrator frequency with a pressure regulator (option - e.g. part of a maintenance unit).

When using a vacuum fixing device with hose set HG .. S you may activate the Economy Air Supply function. For this purpose turn the throttle screw in clockwise direction, until the fixing device can be easily moved by hand. Then start the vibrator by actuating the manual 3/2-way slide valve on the hose set, the full vacuum will be generated.

IMPORTANT

The vacuum fixing device can be operated with filtered compressed air or nitrogen. For operation of certain vibrators a lubricated drive medium is specified.

Adjust the lubricator while the vibrator is running. Exact details concerning can be taken from the operating instructions for the vibrator.

IMPORTANT

When relocating the vacuum fixing device with hose set HG .. S to another surface the economy air supply function must be readjusted or checked on the restrictor screw.

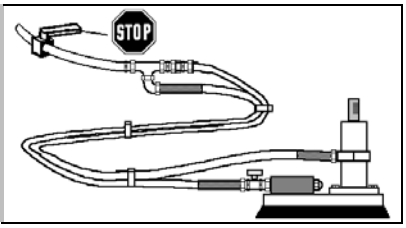
Checklist for commissioning:

1) Secure the VAC against falling down?
2) Check all hose connections before opening the air supply.
3) Turn on the compressed air, if necessary.
4) Position the vacuum fixing device to the desired place.
5) Adjust the lubricator, if present.
6) If necessary adjust the required frequency on the pressure regulator.
7) The compressed air feed lines, the plug screws and the fixing screws have to be tightened and checked.

8 Service / Maintenance

CAUTION

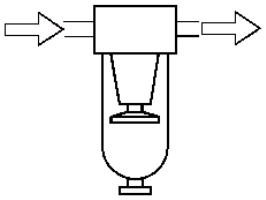
Before starting inspection and service works shut off the compressed air supply and secure it against unintended activation!



IMPORTANT

The drive medium must be clean (filter ≤ 5 µm, class 3). Unfiltered compressed air leads to high wear, blocked silencers or complete break-down of the impactor. The maintenance intervals will be shorter.

For more details, refer to the operating instructions for the relevant vibrator.



≤ 5 µm
Recommendation: Filter

Maintenance plan

Maintenance must be performed monthly.

DANGER

Screw connections	**The screw connections must be checked after an hour of operation (after first startup)**, then at regular intervals and if necessary be tightened and secured with Loctite.
Securing rope	If the safety rope has been extremely loaded by the vacuum fixing device dropping down, it should be replaced by a new one.
Cleaning	Vacuum fixing devices may be cleaned from outside with pressurized water. After cleaning run the unit for a short moment.
Suction cups	The suction cups must be permanently checked for wear and need to be replaced if necessary.
Vacuum nozzle	The vacuum nozzle may be clogged by contaminated compressed air. In this case the nozzle must be disassembled and cleaned. On VAC 8, VAC 10, VAC 11 and VAC 12 the externally vacuum nozzle is easy to disassemble and clean. Disassembly and cleaning of vacuum nozzles on VAC 13, VAC 15, VAC 20, VAC 30 and VAC 40 should only be performed by ***Netter****Vibration*.
Silencer	Clean if necessary. The maintenance intervals depend mainly on the purity of the drive medium and the ambient conditions.
Filter of the maintenance unit	Replace filter insert, empty the filter when required or clean the filter insert (wash out).

9 Troubleshooting

Fault	Possible cause	Trouble shooting	Remedy
Vacuum fixing devices does not generate any vacuum	Air supply	Check pressure before holder. Hose set correctly assembled? For economic air supply check setting of throttle. Hoses kinked? Sufficient cross-section of supply line?	Adjust pressure to 3 bar to 6 bar. Assemble hose set correctly. Adjust throttle. Route hoses without kinks. Enlarge the supply line cross-section.
	Silencer on fixing device clogged	Performance test without silencer.	Wash out or replace, as required
	Vacuum nozzle clogged		Clean (procedure is described in chapter „Maintenance and Repair“.)
	Suction surface	Is the suction surface air-permeable and/or rough?	If yes, the vacuum fixing device is not suitable for this application.
Vacuum fixing devices slips during vibration	Air supply	Hoses kinked?	Route hoses without kinks.
	Silencer clogged		Wash or replace
	Vacuum nozzle clogged		Clean (procedure is described in chapter „Maintenance and Repair“.)
	Suction surface	Is the suction surface air-permeable? Is the suction surface oily, greasy or wet?	If yes, the vacuum fixing device is not suitable for this application. Remove the respective layers.
	Suction cups worn		Replace suction cups
	Extremely massive base (rebounds)		Mount fixing device to the elastic base between stiffeners (diaphragm effect).
	Too high vibration frequency		Adjust frequency with the pressure regulator or the throttle valve.

10 Spare parts

When ordering spare parts please give the following details:

1. **Required quantity**
2. **Description and position of the spare part (see spare parts list)**
3. **Type of unit**

11 Accessories

The following accessories are available for vacuum fixing devices (on request):

Description	**Remark**
Hose material and fittings	For supply and discharge of compressed air in various qualities and dimensions
3/2- or 2/2-way valves	For electric, pneumatic and manual control
Throttle valves	For rotary speed control, manually adjustable or pneumatically controllable (for remote control)
Service units	Filter, regulator, lubricator
Duty/pause control	Electric or pneumatic for interval operation
SPECIAL DESIGNS:	Some vacuum fixing devices are also available as special versions, e.g. with stainless steel plate, for extreme temperature ranges with suction cups made of silicone. Further information on request.

12 Waste disposal

The parts are to be correctly disposed of, depending on the material.

Material specifications:

	VAC 8-12	**VAC 13-40**
Steel	Clamping plate	Fittings
Aluminium	Vacuum nozzle, handgrip	Clamping plate, handgrip
Rubber	Suction cups (black or anthracite)	Suction cups (black or anthracite)
Brass, nickel plated	Fittings	Vacuum nozzle, Fittings
PVC	seals	seals

Special units: Material on request (e.g. suction cups made of silicone)

All units can be disposed off through ***Netter****Vibration*.
The valid disposal prices are available on request.

13 Enclosures

Further information available on request:
Leaflet no. 15 (VAC), and more