These operating instructions apply to:

Version 1 aluminium housing		**Version 2** steel housing
NTS 80	**NTS 75/01**	**NTS 50/10**
NTS 120 HF	**NTS 50/01**	**NTS 30/10**
NTS 120 NF	**NTS 70/02**	**NTS 50/15**
NTS 180 HF	**NTS 54/02**	**NTS 50/20**
NTS 180 NF	**NTS 50/04**	**NTS 30/20**
NTS 250 HF	**NTS 21/04**	**NTS 24/20**
NTS 250 NF	**NTS 50/08**	**NTS 50/40**
NTS 350 HF		**NTS 20/40**
NTS 350 NF		
NTS 100/01		

Use and storage

Before installing the NTS read these instructions carefully. It is the basis for any action when dealing with the NTS, and may be used for training purposes. The instructions should be subsequently stored at the operation site.

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1 General information

Designation

The pneumatic linear vibrators of the series NTS are hereafter referred to as "NTS".

Scope of delivery

Please refer to the delivery note for the scope of delivery.

Check the packaging for possible transport damage. In the event of damage to the packaging, check the contents for completeness and possible damage. Inform the carrier in the case of damage.

Target group

The target group for these instructions is technical staff, who have basic knowledge in pneumatics and mechanics.

Only complying technical staff may work on the NTS.

The NTS may only be installed, put into operation, maintained, troubleshot and disassembled by persons authorised by the operator.

Limitation of liability

All technical information, data and instructions for installation, operation and maintenance in these instructions are based on the latest information available at the time of printing and take our past experience to the best of our knowledge into account.

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 instructions,
- improper use,
- unauthorised repairs,
- technical modifications,
- use of non-permissible spare parts.

Translations are made to the best of our 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 text remains binding.

Model designations

Explanation of additions to names in model designations:

- NTS L: models for oil-free operation
- NTS HT: models for high ambient temperatures
- NTS NT: models for low ambient temperatures
- NTS HF: high frequency models
- NTS NF: low frequency models

Directives / standards observed

The pneumatic linear vibrators of the series NTS comply with the following directives and regulations:

- EC Machinery Directive 2006/42/EC
- Supply of Machinery (Safety) Regulations 2008 (UK)

In particular, the standard EN ISO 12100 has been observed.

2 Safety

Intended use

The NTS are intended for generating linear vibrations.

General applications are: loosening, conveying, sorting, compacting, separating bulk materials and reducing friction. NTS are used for emptying bunkers, as drives for conveyor troughs, sieves and vibrating tables.

The NTS are designed for installation in machines and may only be put into operation, if it has been assured that the complete machine complies with the regulations of the machinery directive.

The NTS may also be used outdoors and in dusty and humid environments. The NTS may not be submerged in bulk materials or in liquids.

Any other use is considered improper.

Qualification of qualified personnel

Installation, commissioning, maintenance and troubleshooting of the NTS may only be performed by authorised qualified personnel, who have basic knowledge in pneumatics and mechanics.

All handling of the NTS is the responsibility of the operator.

⚠ WARNING

Falling parts

The NTS, construction parts as well as fastening and housing screws can come loose due to vibration. Falling parts lead to severe personal injuries.

- ➢ Check the fastening and housing screws after one hour of operation and thereafter at regular intervals (generally monthly).
- ➢ Retighten the fastening and housing screws, if necessary.
- ➢ A safety device with a safety cable is mandatory for critical mounting situations.

⚠ WARNING

Sound level

Near the NTS the sound pressure level may exceed 80 dB(A). The human ear can be permanently damaged by the high sound level.

- ➢ Use suitable ear protection if 80 dB(A) is exceeded.
- ➢ NTS may only be operated with silencer.

⚠ WARNING

Risk of injury while handling heavy parts

Risk of serious injury due to weight during transport and installation of the NTS.

- ➢ Only qualified personnel may transport and install the NTS.
- ➢ Use suitable load handling devices and slinging equipment.
- ➢ Wear suitable personal protective equipment.

⚠ WARNING

Compressed air

A loosened hose which is under pressure can lead to personal injuries.

- ➢ Screw the hose lines on carefully.
- ➢ Check the hose lines and connections after one hour of operation and thereafter regularly (generally monthly).
- ➢ Retighten the hose lines, if necessary.
- ➢ Ensure that the compressed air is disconnected from the supply lines during all work on the NTS.
- ➢ Prevent the NTS from being switched back on during all work.

⚠ CAUTION

Risk of burns due to hot surfaces during synchronous operation

Housing surfaces and synchronous leads can strongly heat up during synchronous operation. Direct contact may cause burns.

- ➢ Do not touch housing surfaces and synchronous leads during synchronous operation.
- ➢ Only operate the vibrators within the permissible ambient temperature, according to Ch. Technical data, page 4.

NOTICE

Operation of the NTS with silencers is mandatory.

Silencers reduce the noise level and protect the NTS from contamination entering.

3 Technical data

Permissible operating conditions

<table>
<tr><td>Drive medium</td><td colspan="2">NTS must be operated with clean, lubricated compressed air or lubricated nitrogen according to the following specification, according to ISO 8573-1:
<table>
<tr><td>[5 :</td><td>6 :</td><td>4]</td></tr>
<tr><td>Filter ≤ 5 µm</td><td>Humidity, Pressure dew point ≤ +10 °C</td><td>Total oil content ≤ 5 mg/m³</td></tr>
</table>
NTS L versions are suitable for operation with oil-free compressed air according to the following specification, according to ISO 8573-1:
<table>
<tr><td>[5 :</td><td>6 :</td><td>2]</td></tr>
</table></td></tr>
<tr><td rowspan="3">Ambient temperature *</td><td>Standard and NTS L-versions</td><td>5 °C to 60 °C</td></tr>
<tr><td>NT-version</td><td>-20 °C to 40 °C</td></tr>
<tr><td>HT-version</td><td>5 °C to 160 °C</td></tr>
<tr><td>Operating pressure *</td><td colspan="2">2,0 to 6,0 bar</td></tr>
</table>

* Higher operating pressures and temperatures are only permitted after consultation with and the written consent of application engineers from ***Netter****Vibration*.

Lubrication	ISO viscosity class according to DIN ISO 3448, VG 5 to 15. Fill the mist lubricator with acid- and resin-free compressed air oil. A mist lubricator is recommended by ***Netter****Vibration* for all NTS (except NTS L).	
	Recommendation for temperatures from 0 °C to 60 °C: Klüber "AIRPRESS 15"	Specification for temperatures from 0 °C to -20 °C: Klüber "ISOFLEX PDP 10"
	Specification for temperatures below -20 °C with NT-versions: BREAK FREE® CLP	Specification for temperatures above 60 °C with HT-versions: Castrol Perfecto HT 5
	Number of drops for the mist lubricator:	
	Type NTS	Drops
	80, 120, 180	1-3 drops/10 minutes
	250, 350	4-8 drops/10 minutes
	100/01, 75/01, 50/01, 70/02	1-2 drops/minute
	54/02, 50/04, 50/08, 50/10, 50/15, 50/20	3-4 drops/minute
	21/04, 30/10, 30/20, 50/40	5-7 drops/minute
	24/20	9 drops/minute
	20/40	15 drops/minute

Further technical data of the NTS can be found in the brochure on *www.**Netter**Vibration.com*.

Connection data

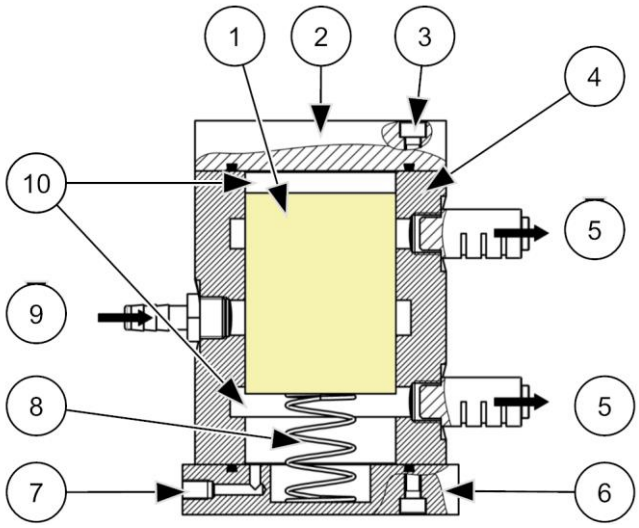
Type: NTS ...	**Mounting thread or hole***	**Tighten-ing torque [Nm]**	**Air supply line**		**Air discharge line**	
			Connection thread [inch]	**Hose size****	**Connection thread [inch]**	**Hose size****
80	M5	4	M5	DN 4	M5	DN 6
120	M8	20	G 1/8	DN 6	G 1/8	DN 8
180	M10	35	G 1/8	DN 6	G 1/4	DN 8
250	M12	45	G 1/8	DN 6	G 3/8	DN 8
350	M12	50	G 1/4	DN 6	G 3/8	DN 8
100/01	M12	30	G 1/4	DN 9	G 1/4	DN 10
75/01, 50/01	9 mm* (for M8)	25	G 1/4	DN 9	G 1/4	DN 10
70/02, 54/02	9 mm* (for M8)	25	G 3/8	DN 9	G 3/8	DN 12
21/04, 50/04	13 mm* (for M12)	87	G 3/8	DN 12	G 3/8	DN 16
50/08	17 mm* (for M16)	215	G 3/8	DN 12	G 3/8	DN 16
50/10	18 mm* (for M16)	215	G 1/2	DN 14	G 3/8	DN 16

Type: NTS ...	Mounting thread or hole*	Tighten-ing torque [Nm]	Air supply line		Air discharge line	
			Connection thread [inch]	Hose size**	Connection thread [inch]	Hose size**
30/10	18 mm* (for M16)	215	G 1/2	DN 22	G 3/8	DN 25
50/15, 50/20, 30/20, 24/20	22 mm* (for M20)	430	G 3/4	DN 14	G 3/8	DN 16
20/40	25 mm* (for M24)	740	G 1	DN 22	G 1/2	DN 25
50/40	26 mm* (for M24)	740	G 1	DN 22	G 1/2	DN 25

* = Mounting hole

** DN = Diameter nominal (inner diameter)

4 Design and function



1 Piston
2 Cover
3 Screw
4 Housing
5 Air outlet / silencer
6 Base plate
7 Start connection (depending on the type)
8 Start spring (depending on the type)
9 Air inlet / grommet
10 Air chamber

There are two versions of the NTS.
Version 1 with aluminium housing and start spring (8) (exception: NTS 21/04).
Version 2 with steel housing and start connection (7).
NTS version 2 units can not start when installed horizontally due to the unfavourable position of the piston. Therefore, these vibrators have a start connection (7) in the base plate (6), so that the piston (1) can be pressed by a short pressure surge into the starting position. For this purpose, an additional pneumatic control is required.

5 Transport and storage

Observe the safety instructions in chap. Safety, starting on page 3.

Transport conditions

Special conditions of transport are not required.

Storage conditions

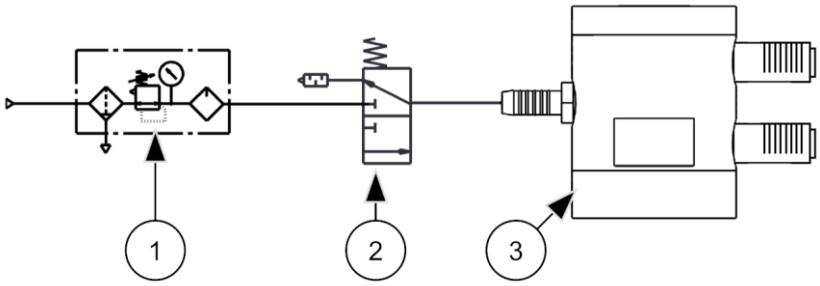
Storage in a dry and clean environment, protected from UV-exposures, weather and ozone. Storage temperature: -20 °C to 60 °C.

Preserve all NTS apart from the NTS L before storage:
Add anti-corrosion oil to the air inlet. Actuate the NTS briefly when mounted. Close all openings afterwards.

6 Installation

Observe the safety instructions in chap. Safety, starting on page 3.

Standard installation



1 Maintenance unit (NTS L: without mist lubricator) 2 3/2-way valve 3 NTS

1. **Notice:** The NTS must lie completely on the surface. The mounting surface has to be flat (±0.1 mm flatness) and clean with no paint residues or burn-ins.
   Netter*Vibration* recommends mounting the NTS on a weld-on console or a glueing console. For operation a 3/2-way valve (minimal valve function) has to be used.
2. Mount the NTS on the console with one or four fastening screws (depending on the type) and suitable safety washers. If necessary, additionally use a medium-strength liquid safety agent to secure the screw connections. Observe the recommended values for screw sizes and tightening torques.
3. Fasten the compressed air supply securely. Observe the recommended cross-sections for valves and hoses. For the air supply, use screw connections with integrated flat seal or liquid sealant. The air resistance increases with the hose length. The specified nominal diameters apply to hose lengths up to 3 m. Longer supply lines require larger cross-sections.
   Discharge the escaping air through a hose if necessary (e. g. in dusty environments). To achieve full performance, the exhaust hose must have a larger nominal size than the supply hose.
4. Mount the silencer/silencers.

Synchronous operation
NTS can also be operated synchronously. For further information to synchronous operation contact ***Netter****Vibration*.

7 Start-up and operation

Observe the safety instructions in chap. Safety, starting on page 3.

Observe the permissible operating conditions in chap. Technical data, page 4.

Starting pressure at low temperatures

At ambient temperatures ≤ 10 °C higher starting pressures (≥ 2 bar) may be required. Start the NTS with a higher pressure of approx. 5 bar and then reduce to 2 bar.

Setting the frequency

The frequency of the NTS is set with the pressure regulator of the maintenance unit.
The frequency and the centrifugal force are reduced by lowering the air pressure before the NTS. At the same time the amplitude remains almost constant.

Adjustment of amplitude

If required, install a throttle valve in the exhaust air line in order to adjust the amplitude of the NTS by throttling the exhaust air. By throttling the exhaust air, the centrifugal force is reduced. The frequency hereby remains almost constant.
Important: Reduced cross-sections already throttle (observe the nominal diameter).
Reduce the amplitude only up to approx. 50 %. This can cause start-up problems if below.

Setting mist lubricator

Set the mist lubricator to the recommended number of drops while the NTS is running.
Notice: The NTS is ready for operation only after adjustment and correct functioning of the mist lubricator.

Stop-intervals

During operation at very short stop intervals (< 1 s), it is possible that the NTS will not start immediately. The reason for this is that the piston has not yet been pushed into the end position by the spring (NTS version 1) or by gravity (NTS version 2).

8 Maintenance and servicing

Observe the safety instructions in chap. Safety, starting on page 3.

Maintenance intervals

The maintenance intervals depend essentially on the operating conditions, the service life and how clean the drive medium is. Unfiltered compressed air leads to high wear, silencer clogging or complete failure of the NTS.

Feature NTS 80 - 350

A base-plate is screwed into the housing of NTS 80 to 350. The following bores are in the base-plate:

- a mounting bore with metric thread,
- two smaller bores to detach and attach the base-plate.

Maintenance plan

Interval	Action
After one hour of operation after initial start-up	Check fastening and housing screws.*
	Check hose screw connections and hose fittings, retighten if necessary.
Monthly	Check fastening and housing screws.*
	Check hose screw connections and hose fittings, retighten if necessary.
	Check hose supply connections for permeability and kinks. If necessary, clean and remove kinks.
	Check the silencer for contamination. Clean silencer.

Interval	Action
Monthly	Check the function of the NTS.
	Check the function of the mist lubricator. Refill oil if necessary (except for the NTS L).
	Clean the filter of the maintenance unit and replace, if necessary.
If necessary	Clean the surface of the NTS with a wet cloth to remove dust deposits.

* Observe the tightening torques (see Chap. Technical data, from page 4 on).

9 Troubleshooting

Malfunction	Possible cause	Corrective action
No start	Silencer polluted	Clean silencer.
	Compressed air supply	Check if there is enough pressure at the NTS. Check valve. A 3/2-way valve is strictly required, so that the supply line to the NTS is vented.
	Cover loose	A leaky cover leads to standstill of the NTS. Tighten screws.
	Line cross-sections	Observe recommended cross-sections (see Chap. Technical data).
	Line between valve and NTS > 3 m	Leads to a slow start and an eventual standstill of the piston in the middle position. If necessary, put a controlled 3/2-way air valve before the NTS.
	Exhaust air throttled too much	Open the throttle valve further. Clean silencer.
	Thread of compressed air connection is too long	Check if the housing is deformed. In case of deformed housing, have the NTS checked by ***Netter****Vibration*.
	Tension during installation	Ensure a flat contact surface.
	Temperature below 5 °C	Use NT-Version..
	Missing ventilation of the housing	Use a 3/2-way valve with adequate cross section.
Rattling	Screws loose	Check fastening and housing screws.
Power loss	Lubrication is missing	Check the function of the mist lubricator.
	NTS polluted	Disassemble NTS and clean it.
	Wear	Check piston and housing for visible wear. If wear is found, send the NTS to ***Netter****Vibration* or replace it. Check mist lubricator.
	Operating pressure too low	Check the pressure at the inlet of NTS during operation. If necessary, increase the pressure. Check line cross-sections.

10 Disposal

All parts of the NTS must be properly disposed of according to the material specifications.
The NTS can be properly disposed by ***Netter****Vibration*. The valid disposal prices are available on request.

Depending on the type, the following materials are built into the NTS:
Steel/stainless steel, aluminium, bronze (NTS BK), brass (NTS HT), copper (NTS HT), plastics.

11 Annex

The declaration of incorporation can be found at: www.***Netter****Vibration*.com