

Valid from 01.07.2021 | Rev. 1.0  
From Serial No. 9328.3023

## NanoFlow MAX

For fiber dimension 0.8-4.5 mm



# Operating manual

**Responsible manufacturer: Fremco A/S**  
**Machine: NanoFlow MAX**

This is the original operating manual for NanoFlow MAX from Fremco.



FREMCO A/S  
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# BEST WARRANTY IN THE BUSINESS

We offer a unique 36 months warranty on all our fiber blowing machines resulting, guaranteeing you the best value for your money.



Our 12 months warranty is automatically included when you purchase your Fremco fiber blowing machine, you automatically get our 12 months warranty. You can then claim your additional 24 months warranty at any point during the following three months in order to obtain the best cost-beneficial warranty in the business.

To maintain your 36 months warranty, you must meet the given annual service and maintenance requirements for each machine as described in the operating manual.

Learn more at [www.fremco.dk/warranty](http://www.fremco.dk/warranty) and get the best factory warranty in the business today!

# 1. INTRODUCTION

## Original instructions

These instructions are Fremco A/S' original instructions for the NanoFlow MAX (hereafter called the machine).

## Purpose

The purpose of these instructions is to ensure correct installation, use, handling and maintenance of the machine. Applicable from machine serial number 9328.3023.

## Accessibility

The instructions are to be kept in a location known to the staff and must be easily accessible for the operators and maintenance personnel.

## Knowledge

It is the duty of the employer (the owner of the machine) to ensure that everybody operating, servicing, maintaining, or repairing the machine reads and understands the instructions. As a minimum, they should read the part(s) relevant to their work.

In addition to this, everybody operating, servicing, maintaining, or repairing the machine is obliged to seek out information in the operating manual when needed.

## 2. GENERAL

### 2.1. MANUFACTURER

The machine is manufactured by

Company name: Fremco A/S  
Company address: Ellehammervej 14  
DK-9900 Frederikshavn

### 2.2. THE MACHINE'S DESIGNATION

The machine's complete designation is NanoFlow MAX.

### 2.3. MACHINE PLATE

The machine plate is situated on the bottom of the machine:

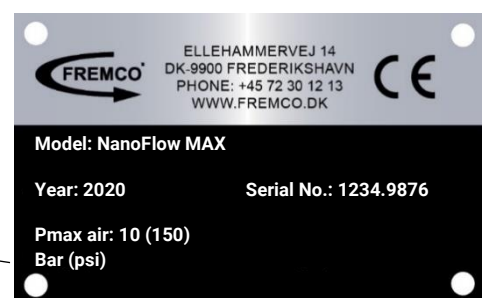


Figure 1: Location of machine plate



Figure 2: Location of the UKCA sticker is placed next to the machine plate

### 3. TECHNICAL SPECIFICATIONS

These specifications cover the NanoFlow MAX fiber blowing machine.

#### NanoFlow MAX

Manufacturer

Fremco A/S  
Ellehammervej 14  
9900 Frederikshavn  
Denmark

Item No.....	101-190911001
Fiber diameter .....	0.8-4.5 mm
Duct diameter .....	3-12.7 mm
Blowing distance <sup>1</sup> .....	Up to 1200 m (3940 ft)
Blowing speed <sup>1</sup> .....	Up to 125 m/min. (410 ft/min)
Pushing force .....	0-2 kg
Maximum air pressure.....	Max. 10 bar (150 psi)
Recommended airflow <sup>2</sup> :.....	Min. 200 l/min. (7.1 cfm)
Ambient temperature.....	0-40°C (32-104°F)
Clamping force on cable .....	14-29N
Weight (without battery) .....	2.8 kg (6.2 lbs)
Length .....	212 mm (8.3")
Width.....	104 mm (4.1")
Height .....	139 mm (5.5")

<sup>1</sup> Depending on type and quality of fiber and microduct

<sup>2</sup> Air must be filtered, cooled and dried



## 4. SAFETY INSTRUCTIONS

- Read and understand this operating manual before operating the NanoFlow MAX. Follow all safety instructions. Failure to follow the instructions may lead to damage on the machine and mild to severe personal injury.
- Make sure to disconnect the machine from the air compressor and dismount the battery, before any kind of adjustment and maintenance takes place.
- Use only batteries that fit NanoFlow MAX. Do not use damaged batteries.



**WARNING:** The use of damaged battery or charger may lead to electric shock, superheating or fire.

- The air pressure should never exceed the recommendations from the suppliers of microducts and fiber. The pressure may never exceed 10 bar, which is the maximum pressure for the Nanoflow MAX blowing machine.



**WARNING:** Exceeding max. pressure may lead to machine damage and mild to severe personal injury.

- Observe that the machine is placed on a stable foundation. Make sure that the fiber and duct are placed correctly in the machine.
- Make sure you do not touch the fiber too close to the machine because you risk getting your fingers injured, and make sure the fiber does not make loops that might be dangerous to persons around the machine.
- Never wear loose clothing
  - **WARNING:** Loose clothing may become entangled in the machine
- Use hearing protection, if the air compressor is placed nearby.

- The operator must make sure that no other persons are close to the machine and cable drums in a way that could be dangerous when the machine is started.
- It is always a clear advantage to be well prepared so that you can run the blowing without interruptions. Pausing in the middle of blowing creates a risk of being unable to start again.
- Make sure the working environment is clean and tidy to avoid injuries due to stumbling over fiber and equipment.

## 5. MAINTENANCE

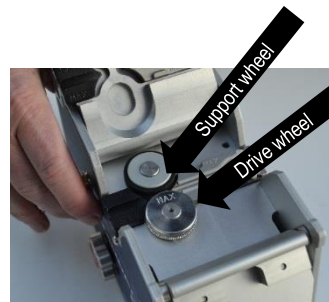
The NanoFlow MAX does not require much maintenance if the following recommendations are followed:

Compressed air must be clean and dry. Use air filter and water separator.

*NB: Humid and polluted air may influence machine life and performance and may result in increased wear.*

Clean the wheels on a regular basis, at least once a day when the machine is in use. Check duct adaptors and rubber belts on wheels for wear and tear on a daily basis, and replace if necessary.

*NB: Failure to maintain and clean the machine may affect machine reliability.*



*It is easy to remove and mount the wheels, as they simply can be clicked on and off.*

Machine service is required annually or every 350 km depending on what comes first.

*NB: To maintain your 36-months warranty, you have to meet the given service requirements.*

*NB: The machine is intended for indoor use and not for use in wet environments, i.e. rainy weather. If the machine is exposed to rain or humidity, it can result in malfunction of the machine and lapse of warranty.*

Charge the battery before operation.

## 6. IDENTIFICATION

These instructions have been made to support the users of the fiber blowing machine NanoFlow MAX. The machine type can be identified by the type plate on the machine. The type plate provides information about serial number, year of production and name and address of the manufacturer.

It is recommended to read this instruction carefully and become familiar with the functionality and maintenance of the fiber blowing machine before use.

## 7. APPLICATION

The fiber blowing machine NanoFlow MAX is constructed for blowing fiber into microducts within the FTTH segment.

We do not recommend use for other applications.

Always use adaptor plates designed for the actual diameter of fiber and duct. The adaptor plates are marked with the size for which they are intended.

It is very important to use the correct adaptor plates. If the adaptor plates do not fit the duct, dangerous situations may occur.

The machine comes in a carrying case. When the machine is not in use or during transportation, always store it in the carrying case.

## 8. MOUNTING

Make sure to place the machine on a stable foundation before blowing.

Alternatively, place the NanoFlow MAX on the tripod or in the shoulder strap, depending on the working situation. Please see the section on Accessories on page 11 for further information.

## 9. SUPPLY OF COMPRESSED AIR

The volume and quality of compressed air is one of the most important parameters in order to achieve good results when blowing fiber. The amount of air needed depends on fiber size, duct size and blowing distance. A capacity less than 200 l/min. is not recommend for long blowing distances.

The compressed air must be filtered, cooled and dried to avoid moisture and dirt in the microduct.



**WARNING:** Do not use compressed air directly from a compressor unit, since the air can be very hot and can damage microduct, fiber and machinery.

For short blowing distances, the NanoFlow MAX can be used without supply of air.



## 10. FIBER PROTECTION

The NanoFlow MAX safety system is unique as it protects the fiber from damage, regardless of the machine setting. The protection system comprises two functions:

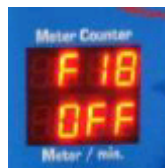
### Torque Limitation

The system adjusts the pushing force on the fiber. It means that you can control the load on the fiber during the blowing process. As a main rule: the larger the fiber, the higher load it can withstand.

At a point in a typical blowing process, the fiber blowing speed will decrease due to friction in the duct. The higher setting of torque, the later this will happen.

At a point the blowing will stop, as it is no longer possible to push the fiber with the chosen torque setting.

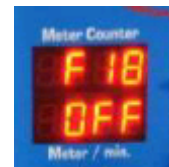
The display on the machine shows “FIB OFF” (fiber stop).



### Wheel Spin Supervision

The system continuously monitors if drive wheel and support wheel run with the same speed. If there is a difference in speed, it means that the drive wheel is spinning on the fiber, and the system immediately stops the blowing process.

The display on the machine shows “FIB OFF” (fiber stop).

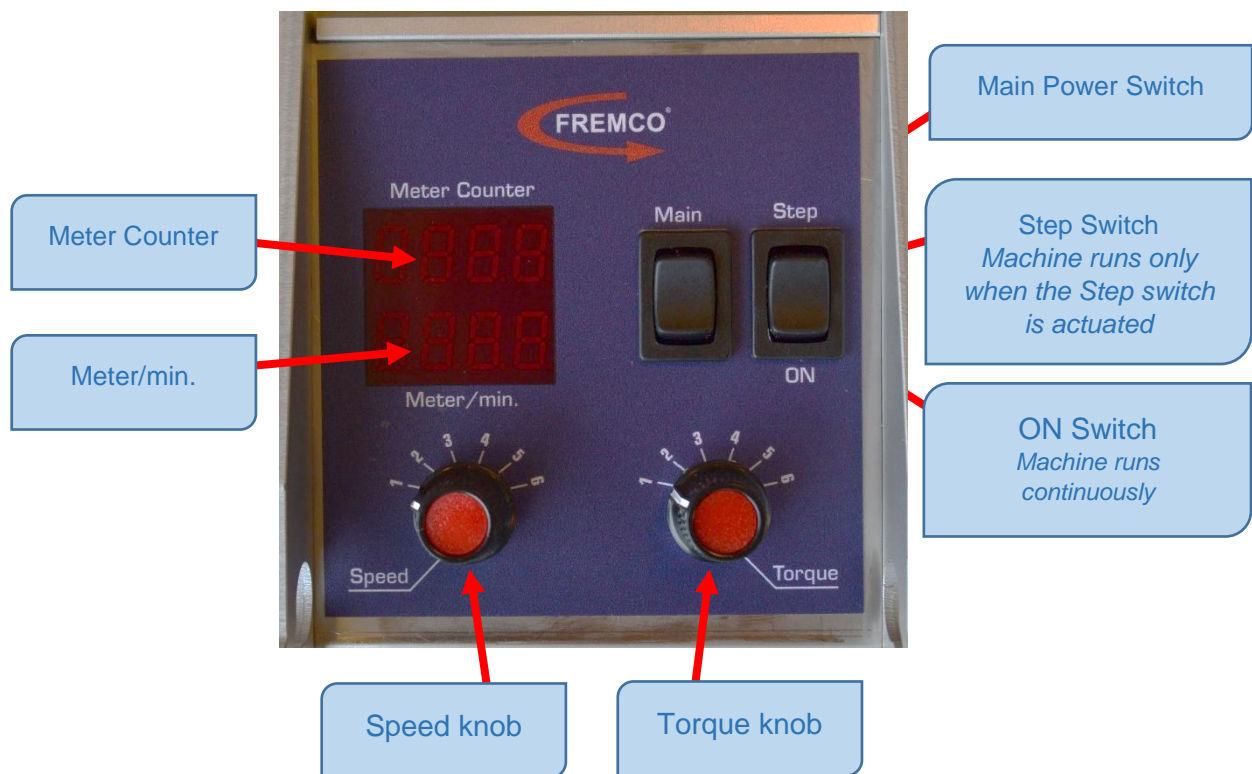
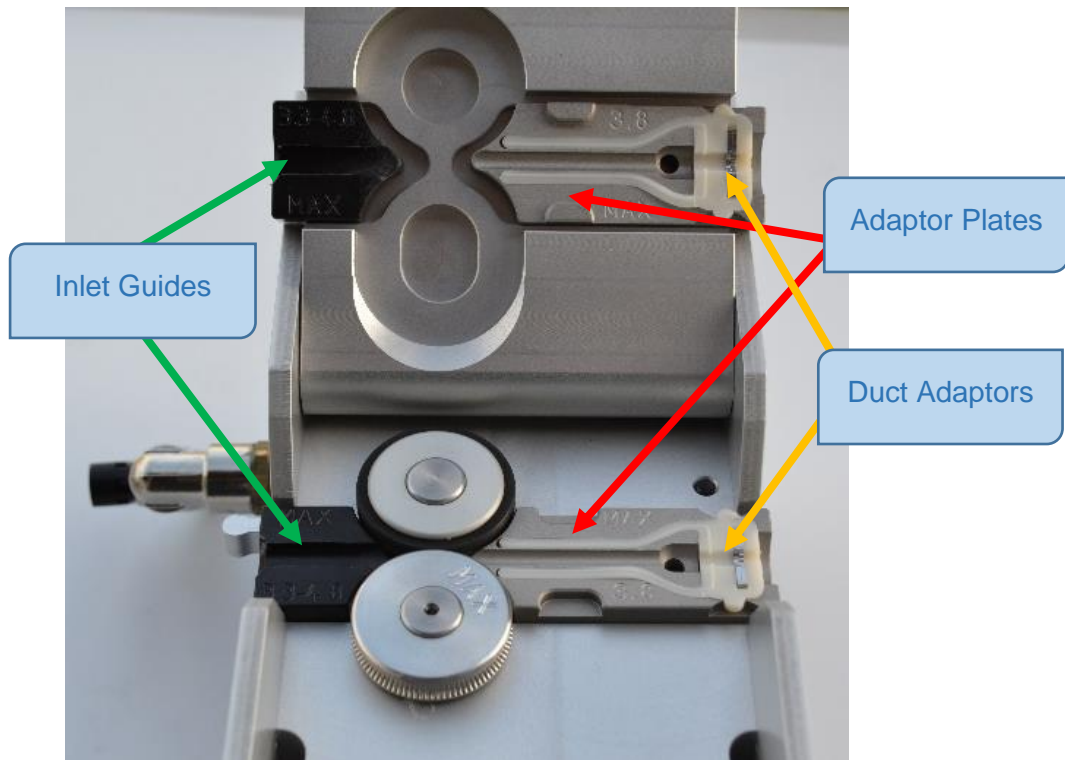


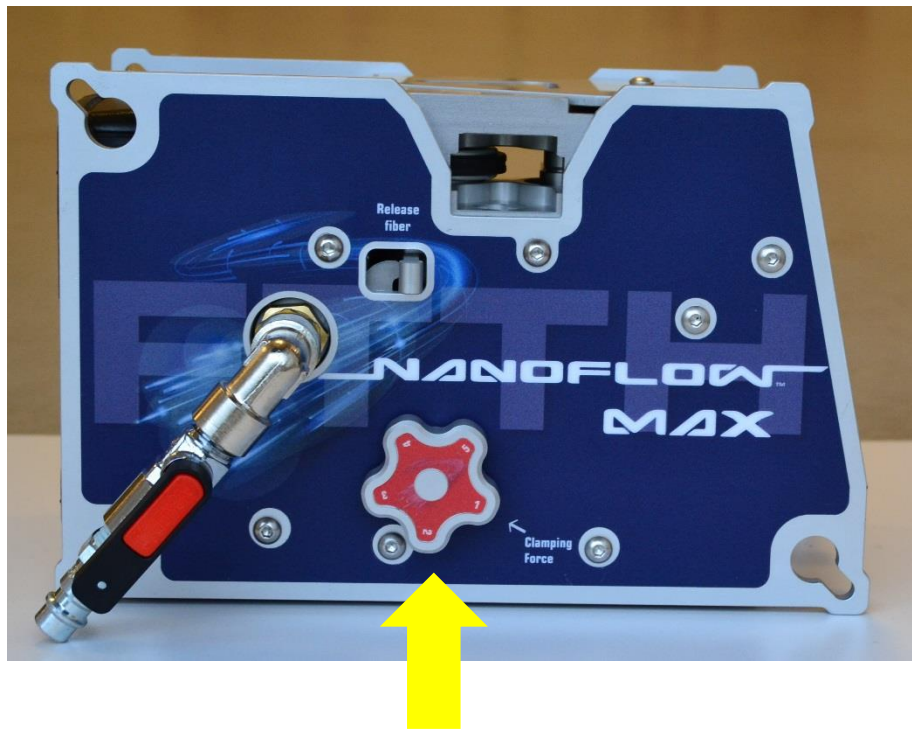
Typically, this situation will occur if torque is set too high for the fiber in question.

### Automatic Stop Function

The protection system can be used to make the machine stop automatically when it has reached the goal. All you need to do is to mount a fiber stop at the end of the duct.

## 11. MACHINE OVERVIEW



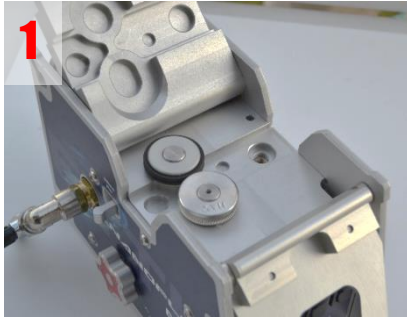


Knob Position	Clamping Force N
1	14
2	18
3	22
4	25
5	29

*NB: Too high clamping force can cause fiber damage.*

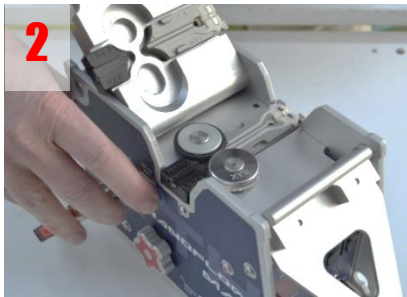
*After every fiber blowing deployment job, the clamping force has to be reset to 1. This secures a longer life of the machine.*

## 12. RUNNING THE FIBER BLOWING MACHINE



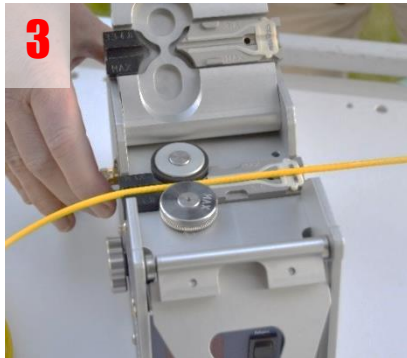
1

Mount the charged battery and open the machine.



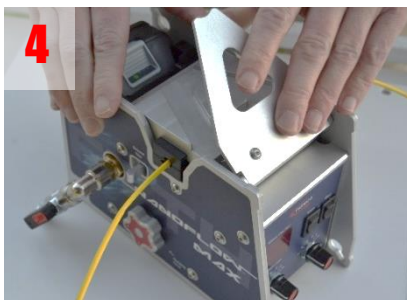
2

Mount adaptor plates (if not already mounted). See detailed mounting guide in section "Photo Guide – Changing Adaptor Plates"



3

Lift the support wheel and push the fiber in between the wheels, approx. 15 cm. Release the support wheel to let it fall into place, thus fixing the fiber between the wheels. Check that the fiber is placed correctly in the grooves of the wheels. Mount the duct in over the fiber and into the adaptor plate.



4

Close the lid and lock it with the lever. Check that the fiber is not stuck and runs smoothly in the machine by lifting the support wheel and pulling the fiber a little back and forth



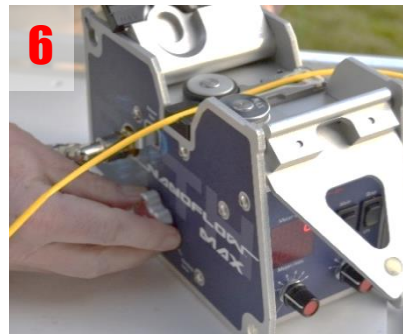
5

Set speed, torque and clamping force (pictures 5 and 6).

Start with low values for both speed, torque and clamping force, and gradually increase to a suitable level.

The machine has two fiber protection systems – torque limitation and spinning protection. Both systems will protect the fiber from damage, independent of speed and torque settings.

*Please see the section on Fiber Protection on page 7 for further information.*



6



7

Turn on the Main power switch. Press ON switch to start running the machine. If you press ON again, the machine stops. If you press Step, the machine keeps running as long as you actuate the switch.



8

When fiber safety is activated, the display shows FIB OFF. Press ON to continue if needed. To reset the counter for a new job, switch off the machine and then on again on the main switch.

*NB: Each fiber blowing job is different, depending on fiber, duct, quality of compressed air, blowing length, weather conditions etc.*

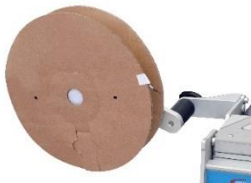
## 13. ACCESSORIES

We offer of number of accessories for use with the NanoFlow MAX:



### Aluminium tripod incl. quick connector

Mount the NanoFlow MAX on the tripod and get a good and stable foundation for fiber blowing. The tripod comes with a quick connector, facilitating mounting of the NanoFlow MAX. The tripod is easy to move around from job to job.



### Reel holder arm

Reel holder arm for preconnected fiber. For mounting on the NanoFlow MAX, facilitating the installation of preconnected fiber.



### Fiber stop end kit

To be placed at the end of the fiber so that the fiber can move towards a stop and activate the fiber safety.



### Valve for reverse airflow

For removal of fiber from a duct, use the valve to blow compressed air through the duct so that the fiber can be pulled out.

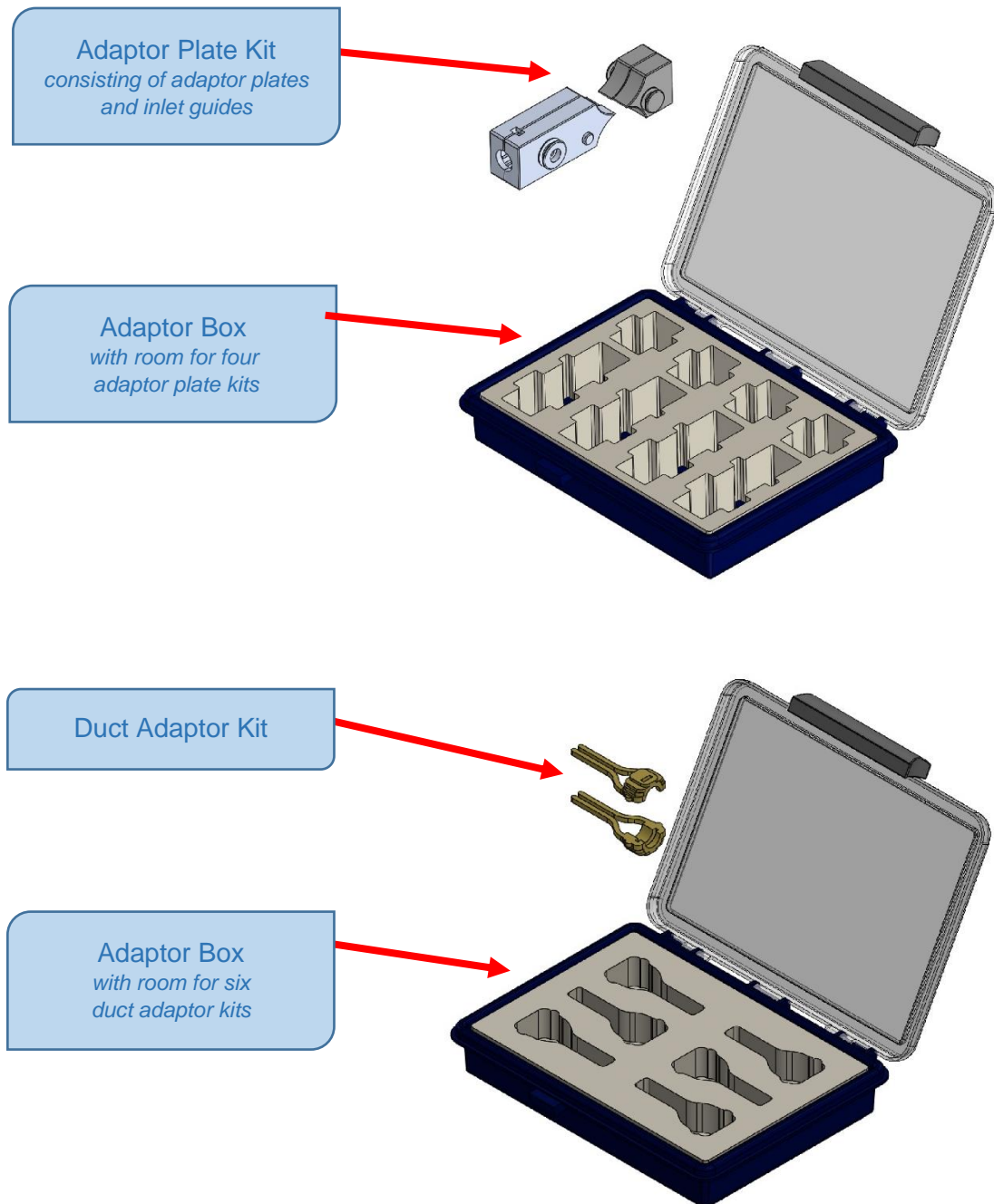


### Shoulder strap

The user can operate the NanoFlow MAX while carrying it in a shoulder strap, so there is no need for a table or tripod. Specifically well suited for preconnected fiber

## 14. ADAPTOR PLATES AND DUCT ADAPTORS

It is important that the adaptor plates and duct adaptors fit the actual size of the fiber and the duct. Below is an overview of the different adaptor components for NanoFlow MAX.



*Many different sizes of adaptor plates and duct adaptors for many different combinations of fiber and duct.*

## 14.1. CHOOSING THE CORRECT ADAPTOR PLATES

A rule of thumb is that the adaptor plate must be at least 0.2 mm larger than the fiber.  
Example: If the fiber is 1.1 mm, choose a 1.3 mm adaptor plate.

## 14.2. PHOTO GUIDE, CHANGING ADAPTOR PLATES

### Preparation of adaptor kit for correct fiber and duct size

- Choose the correct size of adaptor plate to suit the fiber
- Choose the correct size of duct adaptor to suit the duct.
- For NanoFlow MAX always use adaptor plates and steel drive wheel marked with "MAX"



- Mount duct adaptors in both adaptor plates.
- Carefully press in the duct adaptors.

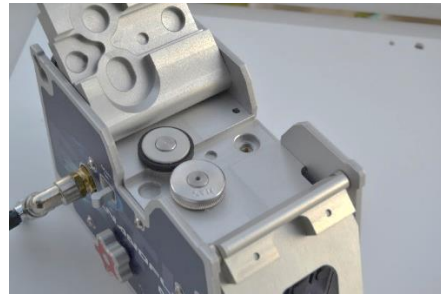


- Check that the position of the duct adaptors is correct. They must fit completely towards the bottom of the adaptor plates.
- The adaptor plates are now ready for mounting in the NanoFlow MAX.

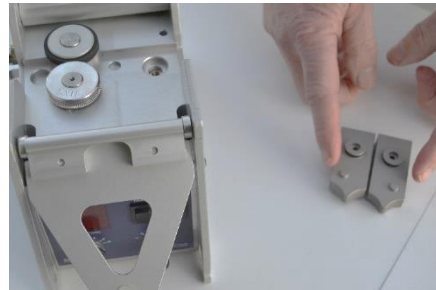


## Mounting Adaptor Plates

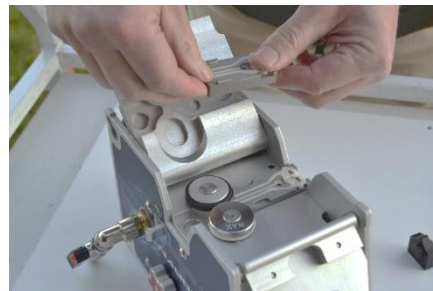
- Check that the wheels are mounted correctly
- Make sure that machine and wheels are clean and free from grease and dirt.



- The adaptor plates are not identical. One is for the top and one is for the bottom.
- The design of the adaptor plates ensures that it is not possible to mount them the wrong way.



- Click the top adaptor plate into position in the lid

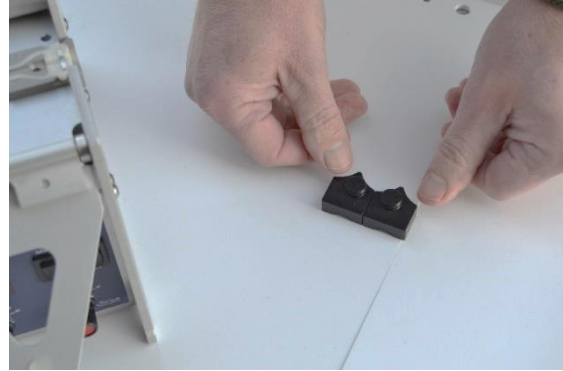


- Click the bottom adaptor plate into position.

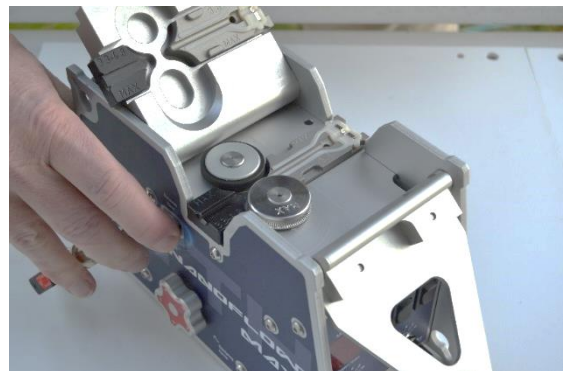




- Like the adaptor plates, the inlet guides are not identical. One is for the top and one is for the bottom.
- Like the adaptor plates, the inlet guides must be at least 0.2 mm larger than the fiber. Example: If the fiber is 1.1 mm, choose 1.3 mm inlet guides.



- Click the inlet guides into position at top and bottom.
- The machine is now ready for use.



## 15. 3-STEP INSTALLATION GUIDE OF FILTER AND WATER SEPARATOR



### 3-step installation guide

of the filter and water separator on compressor

Item No.: 103-160601064



**1.**

Attach the water separator on the compressor's discharge nozzle.



**2.**

Attach air hose on the separator's discharge nozzle.



**3.**

Attach the opposite end of the air hose on the machine.

*NB: Installation of the filter and water separator decreases moisture condensation generated from the airflow of the compressor. To obtain greater fiber blowing performance and equipment durability, we also recommend the use of a dryer/cooler during fiber blowing deployment jobs.*

## 16. EC DECLARATION OF CONFORMITY

### Manufacturer:

Fremco A/S  
Ellehammervej 14  
DK-9900 Frederikshavn  
Denmark

We hereby declare that

**101-1909110001 Nanoflow MAX fiber blowing machine**  
from Serial No. 9328.3023

is manufactured in conformity with the EC Directives

### EC Directives:

**2006/42/EC** – the Machinery Directive

The directive has the dual aim of harmonising the health and safety requirements applicable to machinery on the basis of a high level of protection of health and safety, while ensuring the free circulation of machinery on the EU market.

**2014/30/EU** - Electromagnetic Compatibility (EMC) Directive

The directive ensures that electrical and electronic equipment does not generate, or is not affected by, electromagnetic disturbance.

**2014/35/EU** – The Low Voltage Directive

The directive ensures that electrical equipment within certain voltage limits provides a high level of protection for European citizens, and benefits fully from the Single Market

### International standards:

**DS/EN ISO 12100:2011** - Safety of machinery

The standard specifies basic terminology, principles and a methodology for achieving safety in the design of machinery. It specifies principles of risk assessment and risk reduction to help designers in achieving this objective

### European standards:

**DS/EN ISO 4414:2010** - Pneumatic fluid power

ISO 4414:2010 deals with all significant hazards associated with pneumatic fluid power systems and specifies principles to apply in order to avoid those hazards when the systems are put to their intended use.

### Technical file responsible:

Kasper Mikkelsen  
Research & Development Manager  
Ellehammervej 14, DK-9900 Frederikshavn

### Attested by:



Kim Lindblad Carlsen  
Managing Director

Frederikshavn, 15.10.2019



Kasper Mikkelsen  
R&D Manager

Frederikshavn, 01.07.2021

## 17. UKCA DECLARATION OF CONFORMITY

### Manufacturer:

Fremco A/S  
 Ellehammervej 14  
 DK-9900 Frederikshavn  
 Denmark

We hereby declare that

**101-1909110001 Nanoflow MAX fiber blowing machine**  
 from Serial No. 9328.3023

Is manufactured in conformity with

### UK Directives:

**2008 No. 1597** – Supply of Machine (safety) regulations 2008

The purpose of the legislation is to ensure safe machinery is placed on the market or put into service by requiring manufacturers to show how their machinery meet the ‘essential health and safety requirements’

**2016 No. 1091** - Electromagnetic Compatibility regulations 2016

The purpose of the legislation is to ensure safe products are placed on the GB market by requiring manufacturers to show how their products meet the ‘essential requirements’

**2016 No.1101** – Electrical Equipment (Safety) regulations 2016

### International standards:

**DS/EN ISO 12100:2011** - Safety of machinery

The standard specifies basic terminology, principles and a methodology for achieving safety in the design of machinery. It specifies principles of risk assessment and risk reduction to help designers in achieving this objective.

### European standards:

**DS/EN ISO 4414:2010** - Pneumatic fluid power

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### Technical file responsible:

Kasper Mikkelsen  
 Research & Development Manager  
 Ellehammervej 14, DK-9900 Frederikshavn

### Attested by:



Kim Lindblad Carlsen  
 Managing Director  
 Frederikshavn, 01.07.2021



Kasper Mikkelsen  
 R&D Manager  
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