User manual
Machine type: DSM Xplore Fiber Spin Line; Spinning Unit & Conditioning Unit

Supplier:

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Introduction:
2008

Specifications for the user instructions:
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Foreword

This manual describes the DSM Fiber Spin Line. That is, the Spinning unit and the Conditioning unit. The information contained in this manual is important for the correct and safe operation of the machine. If you are not familiar with operating the Fiber Spin Line then first read this manual carefully from start to finish. DSM Xplore also strongly recommends that all new users (operators, installers, and maintenance staff) are given training, for which this user manual can form the basis.

The risk analysis within the scope of CE conformity has been carried out in combination with the DSM Micro 5/15 Xplore Compounder as the DSM Xplore Fiber Spin Line will normally be used in combination with a DSM Xplore Compounder. When a Compounder other than the DSM 5/15 Compounder is used this manual may not be sufficient and as such a new risk analysis should be carried out.

DSM Xplore recommends storing the original of this user manual including appendices in a safe, central location; a second copy of this user manual can best be kept close to the machine in the workplace.

In addition, it is recommended that a (short and handy) working instruction on operating the machine is prepared by the end-user for daily use.

If you are familiar with these matters then this manual can be used as a reference work. Information you require can be found quickly using the table of contents. The following marking conventions are used in this user manual to draw attention to certain subjects or actions.

<table>
<thead>
<tr>
<th>TIP:</th>
<th>Provides suggestions and advice to make it easier or more convenient to carry out certain tasks.</th>
</tr>
</thead>
<tbody>
<tr>
<td>NOTE:</td>
<td>A comment with additional information to draw attention to possible problems.</td>
</tr>
<tr>
<td>CAUTION:</td>
<td>The machine could be damaged if the procedures are not carried out correctly.</td>
</tr>
<tr>
<td>DANGER</td>
<td>You could suffer (serious) injuries if the procedures are not carried out correctly.</td>
</tr>
</tbody>
</table>
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Warranty

The warranty conditions that are applicable, including liability, are included in the purchase documents.

- The warranty is invalidated if the machine is used for improper purposes and for applications that are not included in the manual.
- The warranty is also invalidated if the machine is used incorrectly or contrary to the instructions.
- The warranty is invalidated if the machine is altered without the supplier’s permission.
- Changes to or disabling safety devices is strictly prohibited.
- The purchaser has no entitlement to compensation, for example in the unlike case of a malfunction or maintenance, for the period that the machine cannot be used.

The following information should be provided when ordering spare parts:
1. The code number of the attached spare part list.
2. The serial number.

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DSM Xplore reserves the right to make changes at any time without the customer’s direct knowledge. The contents of this user manual may be changed also.

Please contact DSM Xplore for additional information in relation to, for example, maintenance and repair. The greatest possible care has been taken in writing this user manual.
Warnings affixed to the machine

A number of pictograms have been affixed to the machine; their aim is to warn the user of residual risks that may still exist despite the safe design.

NOTE:
Regularly check that all pictograms are still affixed to the machine in the correct positions; if not, replace them.

Table 1: Pictograms affixed to the Fiber Spin Line

<table>
<thead>
<tr>
<th>Pictogram</th>
<th>Description</th>
<th>Location on the machine</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Electric Symbol" /></td>
<td>Danger: Danger from or near live parts. Access only for technically competent personnel.</td>
<td>On the outside of the switch box In the switch box near live parts.</td>
</tr>
<tr>
<td><img src="image2.png" alt="Hot Symbol" /></td>
<td>Danger: Danger of burning on contact with hot parts.</td>
<td>On the machine near hot surfaces.</td>
</tr>
<tr>
<td><img src="image3.png" alt="CE Mark" /></td>
<td>CE mark: Indicates conformity with the European Directives.</td>
<td>The CE mark can be found on the machine type-plate which is fixed to the back of the machine.</td>
</tr>
</tbody>
</table>
1 GENERAL SAFETY INSTRUCTIONS

This chapter contains the general safety instructions. Specific safety instructions are shown next to the relevant instruction.

Example: An example of a danger warning that can be found in chapter 2.1.2.

1.1 BEFORE GETTING STARTED

---

**DANGER**

If work is carried out with the Spinning Unit in combination with the DSM 5/15 Compounder, account must be taken of:

- The risk of burns due to the temperature of the compoundinger housing and parts.
- The risks from working with molten plastics.
- The rotating parts of the compoundinger.
- The rotating parts of the Spinning Unit have been designed in such a way that it is impossible to become jammed between the rotating parts of the Spinning Unit due to the low torques.
- The rotating parts of the Conditioning Unit have likewise been designed in such a way that it is impossible to become jammed between the rotating parts due to the low torques.

---

**DANGER:**

The management must ensure that all inspections, maintenance and installation work is carried out by authorized and qualified personnel who have a sound knowledge of the machine/installation having read the user manual.

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**DANGER:**

Read this user manual carefully before taking action in relation to the Fiber Spin Line. DSM Xplore accepts no responsibility for injuries, damage and/or excessive wear resulting from maintenance that is not carried out correctly, the incorrect use of or modifications to the machine.

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**DANGER:**

In the event of issues, questions or problems arising that are not dealt with in this manual, notify your supervisor or contact DSM Xplore.

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**DANGER:**

This machine must not be positioned in locations where there is danger of explosion.
NOTE:
If the machine is used by a third party then you, as the owner/user, are responsible unless an agreement has been reached to the contrary.

DANGER:
Smoking, eating and drinking are not recommended in the vicinity of the DSM Micro 5/15 Compounder including the Fiber Spin Line.

- ensure that there is adequate lighting at the workplace (at least 200 lux during production and 500 lux for repair/maintenance work, for example);
- ensure that the workplace is clean and safe [Health & Safety] and do not leave tools lying around.

1.2 THE MOST SIGNIFICANT RISKS

WARNING OF THE DANGER OF TOUCHING HOT PARTS AND/OR MOLTEN PLASTICS WHEN WORKING WITH THE COMPOUNDER.

SPECIFICALLY:
- There is a risk of burns due to the temperature of the compounder barrel and parts.
- The risks from working with molten hot plastics.

The rotating parts of the Fiber Spin Line have been designed in such a way that it is impossible to become jammed between the rotating parts of the Spinning and the Conditioning unit due to the low torques.
### 1.3 DEALING WITH TECHNICAL SAFETY MEASURES

<table>
<thead>
<tr>
<th>DANGER: When using the DSM Fiber Spin Line in combination with the DSM 5/15 Compounder, it is prohibited to remove guards or safety devices on detachable guards or other safety devices or to circumvent and/or bridge other safety devices using handy constructions. The safety switches on the guards are designed as additional safety devices; merely opening them is not sufficient for safe access.</th>
</tr>
</thead>
<tbody>
<tr>
<td>DANGER: The Fiber Spin Line (Spinning Unit &amp; Conditioning Unit) and the safety devices described in this manual must not be expanded, modified and/or changed without prior written permission from DSM Xplore. Otherwise the Warranty is invalidated.</td>
</tr>
<tr>
<td>DANGER: Repairing or maintaining the electrical circuit or components. First disconnect the mains supply from the machine. Never remove the casing yourself, call in a technically-competent individual.</td>
</tr>
</tbody>
</table>
2 INTRODUCTION

2.1 GENERAL

2.1.1 Intended use

The Spinning Unit is designed to collect small amounts of mono-filament(like) material in combination with the DSM Xplore micro 5 or 15 Compounders. The machines have been designed to speed up research into new synthetics, new combinations of them and new applications for them.

The DSM Xplore Fiber Conditioning Unit is meant for elongating (conditioning) mono-filament spun which is previously collected by the DSM Xplore Spinning Unit in order to improve or alter the properties of the mono-filament. In addition, mono-filament obtained in other ways can be processed on the Conditioning Unit.

Quality material types have been used which have been made durable and easy to clean by applying heat treatments and coatings because many kinds of aggressive and corrosive synthetics can be used.

Any use other than the intended use described above absolves your supplier of any liability.

2.1.2 Target group

The target groups for this user manual are authorized individuals and technically-competent individuals.

Authorized individuals are those individuals who:
- have built up a certain level of knowledge from education/training (internal course specifically for the DSM Xplore 5/15 Compounder & Fiber Spin Line) and who
- have specific skills to operate the machine.

Technically-competent individuals are those individuals who:
- are authorized and who
- have achieved a certain level of knowledge (Senior Secondary Vocational Education diploma) from education/training and who
- are familiar with the machines' technology and who are aware of the possible dangers and risks (personnel trained by DSM Xplore are recommended)

DANGER:
Installation, periodic maintenance and carrying out repairs must be undertaken by technically-competent individuals only unless otherwise indicated.

The start of each chapter containing instructions shows whether the information concerned is intended for authorized individuals or technically-competent individuals.

Operating is understood to mean:
- setting up the machine.
- working with the machine
- cleaning the machine.
- performing simple maintenance tasks.

The aim/function of this user manual is to create a safe and efficient interaction between man and machine.
**Type plate**

The type plate for the Spinning Unit and the Conditioning Unit are fixed to the back of both machines.

The following details are shown on the type plate:

*Figure 1: Spinning Unit*

*Figure 2: Conditioning Unit*

### 2.2 SPECIFICATIONS

#### 2.2.1 Spinning

**Main dimensions**

- Height: 495 mm
- Length: 670 mm
- Width: 450 mm

**Standard Spinning Dies:**

- Diameter: 0.25 – 1.50 mm

**General**

- Spinning weight: 35 kg
- Service life: (with normal use) unlimited
- Spinning speed: max 200 m/min

**Electrical system**

- Supply connection: 230 V
- Power consumption: 70 VA
- Fused at: 3.15 A

**Noise level**

N/A
Environment and storage

The machine must be positioned and used in a non-corrosive, dry environment. The DSM Xplore Spinning Unit must be positioned and used in an environment that preferably:
- has a relatively constant temperature between 0 and 45ºC;
- has a maximum relative humidity of 75%;
- is reasonably free from dust, corrosive gases and high concentrations of organic vapors;
- is not close to a vibration source;
- has a robust floor.

Transport

The DSM Xplore Spinning Unit is packed in transport packaging. In terms of the weight, specific tools are not required for positioning the unit.

2.2.2 Conditioning Unit

Main dimensions

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height</td>
<td>495 mm</td>
</tr>
<tr>
<td>Length</td>
<td>1,725 mm</td>
</tr>
<tr>
<td>Width</td>
<td>450 mm</td>
</tr>
</tbody>
</table>

General

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conditioning Unit weight</td>
<td>75 kg</td>
</tr>
<tr>
<td>Service life</td>
<td>(with normal use) unlimited</td>
</tr>
<tr>
<td>Spinning speed</td>
<td>max. 90 m/min</td>
</tr>
</tbody>
</table>

Electrical system

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply connection</td>
<td>230 V AC</td>
</tr>
<tr>
<td>Power consumption</td>
<td>750 VA</td>
</tr>
<tr>
<td>Fused at</td>
<td>6.3 A</td>
</tr>
</tbody>
</table>

Noise level

N/A

Environment and storage

The machine must be positioned and used in a non-corrosive, dry environment. The DSM Xplore Conditioning unit must be positioned and used in an environment that preferably:
- has a relatively constant temperature between 0 and 45ºC;
- has a maximum relative humidity of 75%;
- is reasonably free from dust, corrosive gases and high concentrations of organic vapors;
- is not close to a vibration source;
- has a robust floor.

Transport

The DSM Xplore Conditioning Unit is packed in transport packaging. Specific tools, such as a lift truck, are required due to the weight. The unit is equipped with adjustable running wheels so the unit can easily be rolled from the transport packaging to a permanent location, and secured there.
2.3 **OPTIONS AND FORM OF CONSTRUCTION**

- Hot Pin
- Fiber tension Meter
- Single slip Measurement
- Double slip measurement
- Ceramic hybrid bearings

2.4 **CERTIFICATION**

The DSM Xplore Spinning Unit and Conditioning Unit comply with the applicable European Directives. Numerous standards have been employed in designing the machines in order to comply with the fundamental requirements of the Directives.

The risk analysis within the scope of CE conformity has been carried out in combination with the DSM Xplore 5/15 Micro Compounder as the DSM Xplore Spinning Unit will normally be used in combination with a compounder.

When an extruder other than the DSM Xplore 5/15 extruder is used this manual may not be sufficient and as such a new risk analysis should be carried out.

The Directives and standards are summarized in the EC Certificate of Compliance (see annex 1)
3 DESCRIPTION OF THE SPINNING UNIT

3.1 GENERAL OPERATING PRINCIPLE

The DSM Xplore Spinning Unit has been designed for coupling with a DSM Xplore Compounder but with only slight modifications this unit can be coupled to almost any small Compounder.

The DSM Xplore Spinning Unit has a speed-regulated Godet roll with a take-up roll coupled to it. Software ensures that the mono-filament can be wound on at a low speed after which pushing a button accelerates up to the required final processing speed.

The Spinning Unit can be fitted with an optional cooling water tank which the filament can be led through.

The DSM Xplore Spinning Unit is controlled with the aid of a Touch screen in combination with a control printed circuit.

The setting options on the touch screen are, amongst others, the take-up roll torque, the winding width, pitch and the spin speed of the Godet roll. Specific programs can be set which can run through a specific profile (wind-on, increase speed, final speed).

The take-up roll ensures that the spun mono-filament can be rolled-up in a neater manner such that later this spool can easily be processed in the DSM Xplore Conditioning Unit.

The take-up rolls on the DSM Xplore Spinning Unit and the DSM Xplore Conditioning Unit are identical. By using separate winding spools that can easily be slid over the take-up rolls these spools can easily be fitted from the Spinning Unit to the Conditioning Unit and vice versa. This makes it very simple to supply the spun filament to the Conditioning Unit.

Data can be stored from both the Spinning Unit and the Conditioning Unit for later analysis using a “USB” connection.

Various options are available for the unit, such as:

For the DSM Xplore Spinning Unit:
- Teflon finish (sticky mono-filaments)
- Rubber finish (slippery mono-filaments)
- Control and Data acquisition software
- Ceramic hybrid bearings
- Skid measurement on Godet
Main parts of the Compounder and Spinning Unit (see figure 3)

<table>
<thead>
<tr>
<th>No.</th>
<th>Description of the part</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Spinning die</td>
</tr>
<tr>
<td>B</td>
<td>DSM Compounder</td>
</tr>
<tr>
<td>C</td>
<td>Godet</td>
</tr>
<tr>
<td>D</td>
<td>Touch screen</td>
</tr>
<tr>
<td>E</td>
<td>Traverse guide</td>
</tr>
<tr>
<td>F</td>
<td>Take-up roll</td>
</tr>
</tbody>
</table>
3.2 DESCRIPTION OF THE ELECTRICAL CIRCUIT

DANGER:
Repairs to the electrical system of the DSM Xplore Spinning Unit should only be carried out by a technically-competent individual.

DANGER:
Switch boxes should only be opened by technically-competent individuals.

Main power

The Spinning unit is powered by a 208-230 Vac/ earthed / 50-60 Hz power supply. This can be switched off at the main input using a switch (0) (See figure 4 below). The main power is protected against short-circuiting and overloading.

![Image of switch box]

Figure 4

There are warnings for these parts in the form of a warning pictogram on the outside of the switch box. Although the majority of these parts are safe to touch, the greatest possible caution is urged. As an additional safety measure a pictogram can be applied to the outside of the switch boxes. (This pictogram is supplied separately).

Control current

The switch box is equipped with a transformer. This transformer supplies the 24 Vac current that is used to supply the printed circuit board.
3.3 SAFETY MEASURES

3.3.1 General

After determining the dangers present and assessing the risks, the following safety measures have been taken to remove or at least minimize the dangers.

The following safety measures have been implemented based on a risk assessment.
- Advice to end user to utilize an grounding cable to guide static electricity safely to ground

3.3.2 Electric safety devices

| DANGER: |
| Switch boxes should only be opened by technically-competent individuals. |

The following safety devices have been incorporated in the electrical system:
- Fuses to protect against overloading and short-circuiting.

3.3.3 Intrinsic safety

1. Safety distances:

DSM Xplore Spinning Unit:
The rotating parts of the Spinning Unit have been designed in such a way that it is impossible to become jammed between the rotating parts of the Spinning Unit due to the low torques values.

DSM 5/15 Compounder:
The moving parts of the DSM 5/15 Xplore Compounder have been positioned in such a way that contact are improbable.
It has been constructed in such a way that the guards have an optimal effect.

2. Static electricity:

| DANGER: |
| Static electricity |

DSM Xplore Spinning Unit:
The speed of the Spinning Unit can be so high that static electricity could be generated. It may be that measures (grounding) will have to be taken to avoid the risk of this occurring as far as possible.

3.3.4 Force in the Spinning Unit

The momentum (torque) that occurs in the powered parts of the Xplore Fiber Spinning is so small that danger aspects are not applicable.

3.3.5 Emergency stops

The DSM Xplore Spinning Unit does not have to be fitted with an emergency stop:
3.3.6 Guards and safety devices

Fixed guards for V-belts and couplings:
The entire machine has been fitted with fixed guards as far as possible. These guards can only be removed with the aid of tools.

- The rotating parts (rolls) on the Xplore Spinning Unit have been designed in such a way that it is impossible to become jammed between the rotating parts of the Spinning due to the low torques values.

3.3.7 Personal safety equipment

Use of personal safety equipment:
The following personal safety equipment is mandatory:
- protective clothing in connection with hot surfaces; (Compounder)
- oral protection in connection with hygiene; (Spinning Unit, Compounder)
- safety shoes;
- safety gloves (hot surfaces, danger of cuts); (Spinning Unit, Compounder)
- safety glasses. (Spinning Unit, Compounder)

3.3.8 Protection against hot parts

DANGER:
Always pay attention to the temperature of the machine (Compounder). The Spinning Die should only be fitted when the Compounder has cooled down.

There is a significant risk of burns if contact is made with the DSM Xplore Compounder as well as the conditioning unit. The temperature of the compounder barrel can rise to a maximum of 400°C (450°C optionally). The Spinning Die should be fitted when the compounder has cooled down. It is obligated that heat resistant safety gloves are worn when working with mono-filament and when “feeding” mono-filament into the DSM Xplore Spinning Unit in connection with the danger of cuts and the possibility of high temperature.

DANGER:
Always remember that it is not only the barrel that is hot. Bolts, steel objects, anything that has been in contact with the DSM Xplore Compounder, even if it has not been in contact with the housing for a couple of minutes, can be hot.
DANGER: The exhaust for the cooling air is on the bottom of the barrel of the compounder. This can be hot!

3.3.9 Safeguards during maintenance / repair / adjustment etc.

Main switches:
The power supply to the switch box can be switched off using a switch. Always remove the power supply lead before opening the switch box. Both the DSM Xplore Compounder and the DSM Xplore Spinning Unit are fitted with a main switch.

DANGER: Ensure that the housing on the compounder and the Spinning Die have cooled down sufficiently before carrying out repair work.

3.3.10 Measures for safe lifting and handling

Because the weight is approximately 35 kg, there are specific measures to be taken if the DSM Xplore Spinning Unit has to be moved or installed. It is recommended to lift or move the Spinning Unit only with suitable hoisting tools.

The DSM Xplore Spinning Unit is placed and secured on a pallet frame as part of the transport crate. It is recommended that this crate is saved for future moves.

The design is such that forklift blades or lifting tools can easily be slid under the frame. The design of the packaging takes account of the stability of the entirety during transport.

3.3.11 Instructions

Instructions and/or advice:
It is recommended that a number of work instructions are written and information sessions are organized in connection with Health and Safety requirements which must be met by the employer.

The recommended work instructions can be found in the foreword to this manual.

3.3.12 Safety measures for working with hazardous substances

Use of personal safety equipment:
When working with the DSM Xplore Spinning Unit in combination with the DSM Xplore Compounder it is possible for poisonous gases/vapors to be released (material dependent). An extractor hood has been placed above the housing for this. This should be connected to an extraction installation of sufficient capacity via an opening that is present on the top of the compounder.

Which products cannot be used in combination?
Avoid the use of highly inflammable liquids/gases when the housing is hot.

Extraction:
Install an extraction unit to extract any harmful vapors or position the compounder in a certified fume hood.
3.3.13 Ergonomics

During the design phase careful attention was paid to good harmonization of ergonomic aspects. Because the operator is constantly present at his workplace, maximum account has been taken of the human aspects in the design and installation of the control panels. The design of the control system is such that it is as clear and well-organized as possible.
4. COMMISSIONING; INSTALLING THE DSM XPLORE SPINNING UNIT

DANGER:
The machine must only operate when all components which belong to the originally supplied machine are fitted.

CAUTION:
Transporting and handling of the DSM Xplore Spinning Unit or parts of it (packaged or otherwise), should be done carefully to avoid damage.

4.1 PREPARATIONS

Unpack the machine.
Remove the packing material without causing damage to the environment.
It is recommended that the DSM Xplore Spinning Unit transport crate is kept for future transport and to simplify any return.
Check the machine for any damage. If damage is observed this must be reported to DSM Xplore (+31 (0)46 4763430).

Should you wish to make a claim under the warranty during the warranty period, you should ensure that you have the original packaging for returning the machine.

4.2 INSTALLATION

TIP:
Find a place where the manual can be kept within reach of the machine operator.

DANGER:
The machine must only be operated if all parts have been fully and correctly installed.

DANGER:
When installing in a different location: observe the safety measures in this chapter.

1. Position the machine level at the workplace. The design of the DSM Xplore Spinning Unit takes account of operation of the machine so that sufficient stability is guaranteed.

The space around the machine must be sufficiently large that operation, maintenance, cleaning and adjustment can take place without problems or additional dangers.
DANGER:
Electrical power supply, cabling etc. up to the switch box must be laid by a certified electrical installation company in accordance with the standards applicable in that country (in the Netherlands this is NEN 1010 / NEN 3140).

2. Complete the electrical connection to the machine.
The electrical installation is connected to the power supply by means of the connecting cable.
   Electrical connection : 230 V AC + earth - 50 Hz
   Power required : 70 VA
   Minimum connection diameter : 1.5 mm²

3. Optional: Connect the machine to the compressed air supply
   Max. Working pressure : 5 bar

Once installation of the machine has been completed, all individuals who are involved with this machine must be trained in relation to the construction, supervision, functioning, maintenance, safety measures and specifications based on this user manual.
5 WORKING WITH THE DSM XPLORE SPINNING UNIT

5.1 OPERATION

DANGER:
Only authorized individuals are allowed to work with the DSM Xplore Spinning Unit in combination with the DSM Xplore 5/15 Compounder. Adjustments and fault analysis must be carried out by technically-competent individuals only.

5.1.1. Description of touch screen operation

The following paragraphs describe how the touch screen works.

5.1.2. Intro screen

![Figure 5](image)

Figure 5

When the Spinning unit is switched on the “intro screen” (see figure 5) will be displayed. After 10 seconds, or when the user touches the screen, the status screen will be displayed. In the meantime the traverse motor moves to its home position.
5.1.3. Status Screen

On the "status screen" (see figure 6) a simple representation of the machine is displayed. From left to right the compounder, godet, traverse guide and the take-up roll are displayed.

At the top of the screen the status of the motors is displayed.

The status can be:
- Reset motors → traverse guide motor moves to its default/home position
- Motors off → all the motors are off
- Startup → motors running at startup speed
- Motors accelerate/decelerate → motors are accelerating/decelerating to the desired speed
- Conditioning/Spinning parameters → current Conditioning/Spinning parameters (elongation step, length and factor)

At the bottom of the screen the following buttons are displayed.

Screen control → control switch, screen/PC is the current status of the control
Program → push this button to go to the conditioning program screen
Motors off → motor switch, on/off is the current status of the motor
Startup → status switch, startup or running is the current status of the motors

Push one of the devices to jump to the setting screens.

Torque roll → torque settings
Traverse guide → traverse settings
Godet → godet settings
Status text (e.g. Motors off) → spinning program

5.1.4. Screen or PC Control

At startup the Spinning Unit is always in screen control. In screen control the Spinning Unit is controlled with the touch screen. When a PC with the Xplore software running is connected, the machine can be switched to PC control. In PC control the machine is controlled entirely by the PC. The touch screen only displays the measured values. The setting screens and buttons (with the exception of the screen/PC control button) on the touch screen are blocked in PC control. If the machine is not connected to a PC or the Xplore pc software isn’t running, the control automatic switches back to screen control after a while.
5.1.5. **Skid Measurement Option**

When the skid measurement option is mounted on the machine, the measured skid percentage is displayed above the godet roll. Zero means that the Take-up roll and godet roll rotate at the same speed (no skid). When e.g. -3% is displayed, the Take-up roll rotates 3% slower than the godet roll. When the skid is positive, the Take-up roll rotates faster than the godet roll. The measurement time is dependent on the speed set point.

<table>
<thead>
<tr>
<th>Speed (cm/min)</th>
<th>Measurement Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 ... 49</td>
<td>25 seconds</td>
</tr>
<tr>
<td>50 ... 199</td>
<td>10 seconds</td>
</tr>
<tr>
<td>200 ... 9000</td>
<td>2.5 seconds</td>
</tr>
</tbody>
</table>

If the machine does not have these options the meaningless value –100% is displayed.

5.1.6. **Torque Settings Screen**

![Torque Settings Screen](image)

**Figure 7**

The Startup torque is used when the machine is running at startup speed. A torque setting below 50 is too low to conquer the friction (in case of the optional ceramic hybrid bearings a setting below 20 is too low) of the roll so it doesn’t start to rotate by itself. The startup torque is adjustable between 0 and 250 (increments of 1). The wind torque can be varied in each program step and adjusted in the spinning program screen.

**Changing set values**

![Changing set values](image)

**Figure 8**

When you touch set values a screen will appear, were you can type in the appropriate value. This applies for any set value in any setting screen.
5.1.7. Traverse Settings Screen

![Traverse settings screen](image)

At startup the waste area is used. After the startup button is pushed the godets accelerate/decelerate to the first program step speed. When all the godets are rotating at the desired speed, the traverse unit moves from the waste area to the wind area. The wind width is the width around the middle. The waste width is the width which remains at the end of the roll. Between the waste and wind width there is always a fixed clearance of 1 cm. With the pitch (lateral movement/rpm) setting the user can change the distance between the mono-filament at the roll. The wind width is adjustable between 10 and 150 mm and the pitch between 0.1 and 4 mm.

5.1.8. Godet Settings Screen

![Godet settings screen](image)

The Startup speed is used when the machine is running at startup speed. Use a low speed so the user can easily mount the mono-filament over the rolls. The startup speed is adjustable between 50 and 200,000 cm/min.

Air cooling can be switch ON and OFF by tipping on either “ON” or “OFF”
5.1.9. **Air Flow Option**

When the air flow option is mounted on the machine, the measured air flow is displayed behind the air button. If the machine does not have this option, a low meaningless value is displayed.

5.2 **CLEANING**

A number of general safety measures apply to cleaning. Thoroughly clean the DSM Xplore Spinning Unit after use.

**CAUTION:**

Always remove the plug from the wall socket before cleaning the machine.

Do not use a high-pressure spray and/or steam cleaner.

**DANGER:**

If cleaning products are used when cleaning, account should be taken of the power supply attached to the DSM Xplore Spinning. Always switch off the power supply to the machine and remove the plug from the wall socket first.

It is recommended that the power is not connected to the machine during cleaning.

**NOTE:**

- Thoroughly rinse off soap remnants / remnants of disinfectants.
- Cleaning products must not contain silicone and must not corrode or damage stainless steel.
- The cleaning products must not produce mutual chemical reactions.
- Use the cleaning products in accordance with the manufacturer’s laid down procedures and guidelines.

5.3 **TESTING AND INSPECTIONS**

**NOTE:**

Carry out these functional tests every day before starting production (also after maintenance, repair, etc.). Notify a technically-competent individual if you observe a fault.

1. Check the operation of the on/off switch.

2. Carry out a visual inspection of all machines. Pay particular attention to the condition of the guards and safety devices.
5.4 FAULTS AND REPAIRS

DANGER:
Technical faults must only be resolved by technically-competent individuals. If you cannot resolve the fault please contact DSM Xplore (www.xplore-together.com).

DANGER:
Never replace parts yourself, call in a technically-competent individual.
6 DESCRIPTION OF THE CONDITIONING UNIT

6.1 GENERAL OPERATING PRINCIPLE

The DSM Xplore Conditioning Unit is a machine that can be used totally independently of any other machine. This unit can therefore be used for conditioning mono-filaments produced using the DSM Xplore Spinning Unit and all other mono-filaments as well. The DSM Xplore Conditioning Unit is equipped with 2 speed-regulated godet rolls that handle the actual conditioning (elongating); the relationship between the two speeds is a measure of the elongation expected in the filament. In addition, the DSM Xplore Conditioning Unit has 2 torque-regulated take-up or supply rolls depending on the direction of the filament, which ensure that the filament is returned to the rolls neatly after elongating. In doing so carton bobbin is used for every roll. The DSM Xplore Conditioning Unit is equipped with a temperature-controlled “Hot Shoe” (heating oven, heating by radiation) where conditioning takes place. (or optionally a “Hot Pin”, heating by conduction) A system of various ceramic guide rolls ensures that the filament is always fed into the oven in the correct manner. The entire DSM Xplore Conditioning Unit is controlled using a software-controlled printed circuit board with a touch screen attached. Any settings required can be made in this touch screen. The entire conditioning process can be divided into various steps with this Conditioning Unit. The filament to be conditioned can be run back and forth a number of times between both take-up rolls. The touch screen can be used to enter a sequence to direct how the conditioning should occur. In addition, during this sequence the temperature and temperature rise band of the “Hot Shoe” can be programmed such that there is complete control of the conditioning process.

Data can be stored from both the Spinning Unit and the Conditioning Unit for later analysis using a “USB” connection.

Various options are available for the unit, such as:
For the DSM Xplore Fiber Conditioning Unit:
- Hot pin which can be acquired as an option.
- Control and data acquisition software
- Axial force measurement
- Ceramic hybrid bearings
- Measured Nitrogen purge hot shoe
- Measured air supply cooling godet
- Slip measurement (single, double)
Main components of the Conditioning Unit (see figure 11)

<table>
<thead>
<tr>
<th>No.</th>
<th>Description of the part</th>
</tr>
</thead>
<tbody>
<tr>
<td>A/K</td>
<td>Supply roll and/or take-up roll</td>
</tr>
<tr>
<td>B/J</td>
<td>Traverse guide</td>
</tr>
<tr>
<td>C/I</td>
<td>Godet</td>
</tr>
<tr>
<td>D</td>
<td>Optional air cooling godet / N² purge hot shoe</td>
</tr>
<tr>
<td>E</td>
<td>Optional Force measurement</td>
</tr>
<tr>
<td>F</td>
<td>Optional Hot Pin</td>
</tr>
<tr>
<td>G</td>
<td>Hot shoe</td>
</tr>
<tr>
<td>H</td>
<td>Touch screen</td>
</tr>
</tbody>
</table>
6.2 DESCRIPTION OF THE ELECTRICAL CIRCUIT

| DANGER: Repairs to the electrical equipment of the DSM Xplore Conditioning Unit should only be carried out by a technically-competent individual. |
| DANGER: Switch boxes should only be opened by technically-competent individuals. |

Main power

The entire conditioning unit is powered by a 208-230 Vac/earthed / 50-60 Hz power supply. This can be switched off at the main input using a switch (0) (see figure 12). The main power is protected against short-circuiting and overloading.

![Figure 12](image)

There are warnings for these parts in the form of a warning pictogram on the outside of the switch box. Although the majority of these parts are safe to touch, the greatest possible caution is urged. A pictogram can also be affixed to the outside of the switch boxes as an additional safety measure. This pictogram (see figure 13) is delivered separately with the Conditioning Unit.

![Figure 13](image)

Control current

The switch box is equipped with a transformer. This transformer supplies the 24 Vac current that is used to supply the printed circuit board. In addition, the printed circuit board is powered from the mains-voltage 208-230 Vac, this is to power the heater.
6.3 **SAFETY MEASURES**

6.3.1 **General**

After determining the dangers present and assessing the risks, the following safety measures have been taken to remove or at least minimize the dangers.

The following safety measures have been implemented based on the risk assessment.
- Temperature insulation on hot shoe
- Safe guard around hot pin

6.3.2 **Electrical safety devices**

**DANGER:**
*Switch boxes should only be opened by technically-competent individuals.*

The following safety devices have been incorporated in the electrical system:
- Fuses to protect against overloading and short-circuiting.

6.3.3 **Intrinsic safety**

1. **Safety distances:**

DSM Xplore Conditioning unit:

The rotating parts of the DSM Xplore Conditioning Unit have been designed in such a way that it is impossible to become jammed between the rotating parts of the Conditioning Unit due to the low torques values.

2. **Static electricity:**

**DANGER:**
- Static electricity

DSM Xplore Conditioning Unit:

The speeds of the DSM Xplore Conditioning Unit are so slow that it is unlikely that static electricity will be generated. It is possible that static electricity will be generated with synthetics that are extremely static-sensitive. Measures must then be taken to discharge the static electricity (Grounding).

6.3.4 **Forces in the Conditioning Unit**

The momentum (torque) that occurs in the powered parts of the Conditioning Unit is so small that danger aspects are not applicable.
6.3.5 Guards and safety devices

Fixed guards for V-belts and couplings:
The entire machine has been fitted with fixed guards as far as possible. These guards can only be removed with the aid of tools.

- The rotating parts (rolls) of the DSM Xplore Conditioning Unit have been designed in such a way that it is impossible to become jammed between the rotating parts of the Conditioning Unit due to the low torques values.
- In addition, the Conditioning Unit is equipped with an independent oven (Hot Shoe) temperature safety device which is set at 325°C for the oven and at 275°C for the optional “Hot Pin”.

6.3.6 Personal safety equipment

Use of personal safety equipment:
The following personal safety equipment is mandatory:
- protective clothing in connection with hot surfaces; (Compounder)
- safety shoes;
- heat resistant safety gloves (hot surfaces, danger of cuts); (Compounder)
- safety glasses. (Compounder)

6.3.7 Protection against hot parts

DANGER:
Always pay attention to the temperature of the machine. The DSM Xplore Conditioning Unit has an electrically heated oven + optionally an electrically heated hot pin.

Although the oven on the DSM Xplore Conditioning Unit is reasonably well insulated, it is always possible for individuals to come into contact with the parts of the unit which can be warm to hot. The temperature of the casing can rise to a maximum of 350°C.

When positioning the mono-filament to be conditioned you should therefore always take account of the temperature of the oven. The use of protective gloves is recommended when working with mono-filament and when guiding the mono-filament during “feeding” onto the DSM Xplore Conditioning Unit as a result of this danger of coming into contact with hot surfaces.

DANGER:
Always remember that it is not only the oven that is hot. Bolts, steel objects, anything that has been in contact with the oven, even if it has not been in contact with the housing for a couple of minutes, can be hot.
6.3.8 Safeguards during maintenance / repair / adjustment etc.

Main switches:
The power supply to the entire DSM Xplore Conditioning Unit can be switched off (0) using a switch that can be found near the main power input at rear right of the machine housing (see figure 15). Always remove the power supply lead before opening the switch box.

Figure 15

DANGER:
Ensure that the oven on the DSM Xplore Conditioning Unit has cooled down sufficiently before carrying out maintenance work.

6.3.9 Measures for safe lifting and handling

Because the weight is approximately 70 kg there are specific safety measures to be taken if the DSM Xplore Conditioning Unit has to be moved or installed. The DSM Xplore Conditioning Unit is placed and secured on a pallet frame as part of the transport crate. It is recommended that this crate is saved for future moves. The design is such that forklift blades or lifting tools can easily be slid under the frame. The design of the packaging takes account of the stability of the entirety during transport. Because of the weight, suitable hoisting tools and/or specialist skills/firms should be used for horizontal and vertical transport.

6.3.10 Instructions

Instructions and/or advice:
It is recommended that a number of work instructions are written and information sessions are organized in connection with Health and Safety requirements which must be met by the employer.

The recommended work instructions can be found in the foreword to this manual.
6.3.11 Safety measures for working with hazardous substances

Use of personal safety equipment:
Toxic gases/vapors (product dependent) may be released when working with the DSM Xplore Conditioning Unit. A suitable extractor should be fitted above the oven for this.

Which products cannot be used in combination?
Avoid the use of highly inflammable liquids/gases when the oven is hot.

Extraction:
Install an extraction unit to extract any harmful vapors.

6.3.12 Ergonomics

During the design phase careful attention was paid to good harmonization of ergonomic aspects. Because the operator is constantly present at his workplace, maximum account has been taken of the human aspects in the design and installation of the control panels. The design of the control system is such that it is as clear and well-organized as possible.
7 COMMISSIONING; INSTALLATION; DSM XPLORE CONDITIONING UNIT

**DANGER:**
The machine must only operate when all components which belong to the originally supplied machine are fitted.

**CAUTION:**
Transporting and handling the DSM Xplore Conditioning Unit or parts of it (packaged or otherwise), should be done carefully to avoid damage.

7.1 PREPARATIONS

Unpack the machine.
Remove the packing material without causing damage to the earth environment.
It is recommended that the DSM Xplore Conditioning Unit transport crate is kept for future transport and to simplify any return.
Check the machine for any damage. If damage is observed this must be reported to DSM Xplore (+31 (0)46 4763430).

Should you wish to make a claim under the warranty during the warranty period, you should ensure that you have the original packaging for returning the machine.

7.2 INSTALLATION

**TIP:**
Find a place where the manual can be kept within reach of the machine operator.

**DANGER:**
The machine must only be operated if all parts have been fully and correctly installed.

1. Position the machine level at the workplace. The design of the DSM Xplore Conditioning Unit takes account of operating the machine so that sufficient stability is guaranteed.

The space around the machine must be sufficiently large that operation, maintenance, cleaning and adjustment can take place without problems or additional dangers.

**DANGER:**
Electrical power supply, cabling etc. up to the switch box must be laid by a certified electrical installation company in accordance with the standards applicable in that country (in the Netherlands this is NEN 1010 / NEN 3140).
2. Complete the electrical connection to the machine.
   The electrical installation is connected to the power supply by means of the connecting cable.
   Electrical connection : 230 V AC + earth - 50 Hz
   Power required : 500 VA

3. Connect the machine to the compressed air supply
   Working pressure : 5 bar

4. Connect the machine to the nitrogen supply
   Working pressure : 5 bar

Once installation of the machine has been completed, all individuals who are involved with this machine must be trained in relation to the construction, supervision, functioning, maintenance, safety measures and specifications based on this user manual.
8.1 OPERATION

DANGER:
Only authorized individuals should work with the DSM Xplore Conditioning Unit. Adjustments and fault analysis must be carried out by technically-competent individuals only.

8.1.1 Description of touch screen operation

The following paragraphs describe how the touch screen works.

8.1.2 Intro screen

When the conditioning unit is switched on, the intro screen will be displayed (see figure 16). After 10 seconds, or when the user touches the screen, the status screen will be displayed. In the meantime the traverse motors move to their default/home position.

Figure 16
8.1.3 Status screen

From left to right the left take-up/supply roll, left traverse unit, left godet, hot shoe, right godet, right traverse unit and right take-up/supply roll are displayed (see figure 17).

At the top of the screen the status of the conditioning unit is displayed. The status can be:
- Reset motors → traverse motors move to their default/home position
- Motors off → all the motors are off
- Startup → motors running at startup speed
- Motors accelerate/decelerate → motors are accelerating/decelerating to the desired processing speed
- Conditioning parameters → current conditioning parameters (step, length and elongation factor)
- Heater error → the heater or thermocouple is defective

At the bottom of the screen the following buttons are displayed.
- Screen control → control switch, screen/PC is the current status of the control
- Heaters off → heater switch, on/off is the current status of the heaters
  - Program → push this button to go to the program screen
- Motors startup → status switch, startup or running is the current status of the motors

Push one of the devices to jump to the setting screens.
- Take-up/supply roll → torque settings
- Traverse guide → traverse settings
- Godet → godet settings
- Hot pin or shoe → temperature settings
- Status text (e.g. Motors off) → conditioning program (manual or automatic)
8.1.4 Screen or PC Control

At startup the conditioning unit is always in screen control. In screen control the conditioning unit is controlled with the touch screen. When a PC with the Xplore software running is connected, the machine can be switched to PC control. In PC control the machine is controlled entirely by the PC. The touch screen only displays the measured values. The setting screens and buttons (with the exception of the screen/PC control button) on the touch screen are blocked in PC control. If the machine is not connected to a PC or the Xplore PC software isn’t running, the control automatic switches back to screen control after a while.

8.1.5 Skid Measurement Option

When the skid measurement option is mounted on the machine, the measured skid percentage is displayed above both godet rolls. Zero means that the Take-up/supply roll and godet roll rotate at the same speed (no skid). When e.g. -3% is displayed, the Take-up/supply roll rotates 3% slower than the godet roll. When the skid is positive, the Take-up/supply roll rotates faster than the godet roll. The measurement time is dependent on the speed set point.

<table>
<thead>
<tr>
<th>Speed Set Point</th>
<th>Measurement Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 ... 49 cm/min</td>
<td>measurement time 25 seconds</td>
</tr>
<tr>
<td>50 ... 199 cm/min</td>
<td>measurement time 10 seconds</td>
</tr>
<tr>
<td>200 ... 9000 cm/min</td>
<td>measurement time 2.5 seconds</td>
</tr>
</tbody>
</table>

If the machine does not have these options, the meaningless value –100% is displayed.

8.1.6 Force Measurement Option

When the force measurement option is mounted on the machine, the variation in comparison with the average force measurement of the previous 16 seconds is displayed (see figure 18).

![Figure 18](image)

If the machine does not have this option, the bar graph points to the middle.
8.1.7 Torque Settings Screen

The Startup torque is used for the Take-up roll while the machine is running at startup speed. The wind and unwind torque is separately adjustable. The unwind torque is the same for all program steps including startup. The unwind torque can be positive or negative. A negative unwind torque works in the opposite direction to the godets (pulls on the mono-filament) and a positive torque works in the same direction (to overcome bearing resistance).

A torque setting between –50 and 50 is too low to conquer the friction of the roll friction (in case of the optional ceramic hybrid bearings a setting below -20 and 20 is to low) so it doesn’t start to rotate by itself. The startup torque is adjustable between 0 and 250 and the unwinding torque between –250 and 250.

The wind torque can be varied in each program step and adjusted in the conditioning program screen.

Changing a set values

When you touch set values a screen will appear, were you can type in the appropriate value (see figure 19 and 20).

This applies for any set value in any setting screen
8.1.8 Traverse Settings Screen

At startup the waste area is used. After the startup button is pushed the godets accelerate/decelerate to the first program step speed. When all the godets are rolling at the desired speed, the traverse unit moves from the waste area to the wind area.
The wind width is the width around the middle. The waste width is the width which remains at the end of the roll. Between the waste and wind width there is always a fixed clearance of 10 mm.
With the pitch (lateral movement/rpm) setting the user can change the distance between the mono-filament at the roll.
The wind width is adjustable between 10 and 150 mm and the pitch between 0.1 and 4 mm.

8.1.9 Godet Settings Screen

The Startup speed is used for both godets while the machine is running at startup speed. Use a low speed so the user can easily mount the mono-filament over the machine. The startup speed is adjustable between 50 and 9000 cm/min.
With the air cooling buttons, godets and nitrogen valve, the air and nitrogen valves can be switched on and off.
8.1.10 Air and Nitrogen Flow Options

When the air and nitrogen flow option is mounted on the machine, the measured air and nitrogen flow is displayed behind the air and nitrogen buttons. If the machine does not have these options, a low meaningless value is displayed.

8.1.11 Temperature Settings Screen

![Figure 24](image)

With the heater selection the heated “PIN” or “SHOE” can be selected as heating device. The temperature set point is the setting for the selected heating device. With the temperature rise band the user can select when the machine displaying the heating device is at the correct temperature. When the measured temperature of the heating device is less than the rise band setting above or is below the set point OK is displayed on the status screen. The temperature set point is adjustable between 0 and 300 °C and the rise band between 0 and 250 °C. (see figure 24)

8.1.12 Hot Pin Option

When the hot pin option is mounted on the machine (see figure 25), the user can select the heater device. If the heater device is changed, the displayed heater device (hot pin or shoe) on the status screen also changes. The temperature of the hot pin is controlled via the touch screen, up to a maximum temperature of 250 °C. If the machine does not have these options the heater selection is not displayed.
8.1.13 Elongation Program Screens

**Manual mode**

![Manual Mode](image)

With the auto/manual button the user can select to use the manual settings or the elongation program. In manual mode the speed, elongation factor and torque can be changed while the machine is running. The speed setting is the speed of the fastest godet. The torque setting is the torque of the take-up/supply roll. A torque setting below 50 is too low to conquer the friction of the roll friction (in case of the optional ceramic hybrid bearings a setting below 20 is too low) so it doesn’t start to rotate by oneself. The torque of the supply/unwind roll is setup in the torque settings screen. In manual mode the length setting is not available. The user has to stop the machine after the desired length is produced. After a setting is entered in manual mode the machine will directly use this new setting. In automatic mode the complete sequence must be filled in before the machine is started.

In both modes the speed is adjustable between 50 and 9000 cm/min, the factor between 1,00 and 10,00 times and the torque between 0 and 250. The length setting is only available in automatic mode and is adjustable between 0 and 999,9m.

**Automatic mode**

![Automatic Mode](image)

In automatic mode the direction, speed, factor length and wind torque is adjustable. If one of the arrows is touched, the direction changes. It is possible to wind in one direction or the wind (max. 10 steps to the left) direction is changed every program step (left to right (loops). The speed setting is the speed of the fastest roll. The factor is the setting for mono-filament elongation. After the length setting in a step is produced, the machine goes to the next program step. When “length” is set to zero in a program step, the machine stops. The wind torque can also be set in every program step. The unwind torque (to overcome bearing resistance) is the same for all program steps and adjusted in the torque settings screen.
Changing the set values in rectangles

Figure 29

When you touch set values a screen will appear, were you can type in the appropriate value (see figure 29).
This applies for any set value in any setting screen

8.2 CLEANING

A number of general safety measures apply to cleaning.
Thoroughly clean the DSM Xplore Conditioning Unit after use.

CAUTION:
Always remove the plug from the wall socket before cleaning the machine.

Do not use a high-pressure spray and/or steam cleaner.

DANGER:
If cleaning products are used when cleaning, account should be taken of the power supply connected to the DSM Xplore Conditioning Unit.
Always switch off the power supply to the machine first and remove the plug from the wall socket.

It is recommended that the power is not connected to the machine during cleaning.

NOTE:
- Thoroughly rinse off soap remnants/remnants of disinfectants.
- Cleaning products must not contain silicone and must not damage stainless steel.
- The cleaning products must not produce mutual chemical reactions.
- Use the cleaning products in accordance with the manufacturer’s laid down procedures and guidelines.
8.3 TESTING AND INSPECTIONS

NOTE:
Carry out these functional tests every day before starting production (also after maintenance, repair, etc.). Notify a technically-competent individual if you observe a fault.

1. Check the operation of the on/off switch.
2. Carry out a visual inspection of all machines. Pay particular attention to the condition of the guards and safety devices.

8.4 FAULTS AND REPAIRS

DANGER:
Technical faults must only be resolved by technically-competent individuals. If you cannot resolve the fault please contact DSM Xplore (service@xplore-together.com).

DANGER:
Never replace parts yourself, call in a technically-competent individual.
9 MAINTAINING BOTH UNITS

9.1 GENERAL

WARNING:
Never replace parts yourself, call in a technically-competent individual.

In order to guarantee the correct functioning of the machines it is important that they are well maintained.

It is important that all parts which are subject to wear and tear are checked regularly for correct functioning and that they are replaced in good time if worn.
Consider the bearings of the various motors and the take-up rolls here too.
The various drive belts should also be checked for wear.

9.2 WEEKLY MAINTENANCE

DANGER:
Maintenance should be carried out by authorized individuals only.

1. Check the on/off switch.
2. Inspect the guards on the drive.
3. Regularly check the electrical cables for defects.

9.3 REPLACEMENT PARTS

Replacement parts can be ordered from:
DSM Xplore
PO Box 18
6160 MD Geleen
The Netherlands
Tel.: +31 (0)46 4763430
Homepage: www.xplore-together.com
E mail : service@xplore-together.com
info@xplore-together.com
DISPOSAL: ENVIRONMENT, THIS APPLIES EQUALLY TO BOTH UNITS

**Scraping**

If the machine is to be scrapped, the waste processing regulations applicable at the place and time of scrapping must be observed. This applies to worn parts and to machine components that are replaced by newer versions. In both cases the customer/user is responsible for disposing of these parts.

**Reuse**

Most of the components of the DSM Fiber Spin Line are manufactured from stainless steel/aluminum. These parts can be disposed of as scrap metal.
11 APPENDIX: FIRST “USE” PRACTICAL OPERATING GUIDELINES

All safety measures and precautions mentioned earlier in this manual should be considered and applied!

**Spinning Unit**

- Connect filtered air line in the “Air” push connector (if desired)
- Switch on spinning unit at the rear right side (1) (see figure 30)

![Figure 30](image)

The following screen will appear (see figure 31)

- Tip with a finger onto the screen the status screen will appear below (see figure 32)

![Figure 31](image)

![Figure 32](image)

- Tip with a finger onto the “PROGRAM” button (see Figure 32)
The following screen “Manual Mode” will appear below (see figure 33)

Set the spinning speed of app. 50 m/min (an easy operatable value)
This is the final spinning speed! (see figure 33)

To change a value tip with your finger on the value and the set screen will appear.
Type in the desired value and push “ENT”. This applies for all screens! (see figure 34)

Set torque of winding roll to 100 Nmm in the torque settings screen (see figure 35)

Set torque of winding roll to 100 Nmm in the torque settings screen (see figure 35)
Set godet startup speed to 100 cm/min Godet settings screen (novice speed) (see figure 36)

Note: At the “Startup speed” you manually mount the mono-filament

- Set amount of cooling air if desired

- Set winding width to app. 125 mm pitch of 2 mm (lateral movement/rpm) (see figure 36 and 38)

- Push button “motors on” (see figure 39)

The spinning unit will accelerate to its “startup” settings
**Compounder** (see operating manual DSM Xplore compounder 5/15)

- Mount mono-filament die to the main barrel exit (Allen wrench 2 mm)
- Heat the compounder up to the desired processing temperature
- RPM compounder during filling < 50
- Fill the compounder with spinnable material
- Once filled set compounder RPM around 5 (See figure 39a)

*Figure 39a*

![Speed, Acceleration & Force-control](image)

*Figure 39b*

- Open the valve of the main barrel

Note:
Distance between compounder and spinning Unit between 0,5 and 1 meter (polymer dependant)

*Figure 40: top view godet*
• Pull the extrudate towards the spinning unit threw the white cramic guide hook (see figure 40)

Figure 41: front view godet

• Mount the mono-filament 3 to max 6 times over the 2 rolls (see figure 40 + 41)
• Manually decelerate the winding roll
• Mount the mono-filament over the traverse guide threw the white ceramic guide hook (see figure 42 + 43)

Figure 42                               Figure 43

• Lock the mono-filament onto the carton bobbin (see figure 43)
• Release the winding roll (it will start rotating again with the pre-setted torque values)
• Push the button “STARTUP” on the screen (see figure 44)

Figure 44

The spinning unit will accelerate to the final spinning speed of 50 m/min
Note:
If the mono-filament breaks between the compounder and the spinning unit lower the godet speed.
Be sure that there is enough torque on the mono-filament while winding at the final spinning speed.
Rule of thumb is: The thicker the diameter of the mono-filament, the more torque is needed to bend the mono-filament around the bobbin.
Once a “steady state” of processing and spinning is achieved, switch the DSM Xplore Compounder 5/15 from speed control to vertical force control using the value which was observed during the “steady state”. (see Compounder; page 51 and figure 39a + 39b)
Now a certain amount of throughput control is realized by maintaining the vertical force and changing the screw speed of the compounder accordingly.
In combination with screw acceleration (setting around app. 40 rpm/min) we even achieve even better throughput control.
Whenever feeling comfortable with the spinning process you can speed up the spinning process.
Remember it is a very accurate process with a narrow processing window.

Be advised: only small changes in settings during the fiber spinning process.
Conditioning Unit

We advice during practicing to use Polyamide mono-filament. Thickness: 0.2 mm (Note: the cheapest fishing line, which still elongates)

- Mount 1 bobbin with mono-filament on the left winding roll and mount one empty bobbin onto the right winding roll
- Connect filtered air line in the “Air” push connector (if desired)
- Connect Nitrogen purge for hot shoe into the “N’ push connector (if desired)
- Switch on conditioning unit at the rear right side (1) (see all figure 45)

![Figure 45](image)

The following screen will appear (see figure 46)

![Figure 46](image)

- Tip with a finger onto the “PROGRAM” button (see Figure 47)
• The following screen “Manual Mode” will appear below (see figure 48)

![Manual Mode Screen](image1)

Figure 48

• If Automatic mode screen appears tip once again with a finger onto the button “AUTO/MANUAL:” select “MANUAL” the following screen “Manual Mode” will appear below (see figure 43)

• Set Speed (godet speed of the most right Godet roll) to 500 cm/min this is the speed during the conditioning phase

• Set Factor 1.1 (theoretical elongation of 10%)

• Torque to 80 Nmm (to keep the mono-filament nice and tidy on the bobbin

Select the button “GODET SETTINGS” the following screen will appear (see figure 49)

![Godec Settings Screen](image2)

Figure 49

• Select a “Startup speed” of app. of app. 300 cm/min, this is the speed during the mounting of the mono-filament onto the conditioning unit (see figure 49).
The “status screen” will reappear (see figure 50)

Figure 50

- Tip with on the temperature indication above the “Hot Shoe” (see figure 50)
- The following screen will appear (see figure 51)

Figure 51

- Select “SHOE”
- Set “Temperature setpoint” and set 120 °C
- Set “Temperature rise band to 5 °C
- Select “RETURN”
The “status screen” will re-appear (see figure 52)

- Switch “HEATER OFF button to “HEATER ON”

The “Hot Shoe will start heating to 120 ºC
Mount the mono-filament according to figure 54 until 60)
Note: **Under** the two pink guide rolls and **over** the optional “Tension Meter”

- Open the “Hot Shoe” guide mono-filament **under** the pink ceramic guide rolls (see figure 58)
- Leave ‘Hot Shoe’ open!

- **Continue under** the pink ceramic guide rolls (see figure 57)
Note: Over the 2 rolls and threw the white ceramic guides hook (see figure 58 + 59)

*Wind the mono-filament a few times around the bobbin and lock into in the designated slits (see figure 59 + 60)*
After you locked the mono filament in the slit

- Switch Button “MOTORS ON to “MOTORS OFF”
- Wait until “Hot Shoe” reaches the pre-setted temperature of $120^\circ$C
- Whenever the “Hot shoe” reached its desired temperature Switch Button “MOTORS OFF to “MOTORS ON”
- Followed by the button “MOTORS STARTUP” (See all figure 63)

The conditioning unit will now start to conditions the mono-filament according to the programmed settings.
Note: the mono-filament needs to be above “glass” temperature when exiting the “Hot shoe” otherwise no elongation will occur.

Once you feel comfortable with operating the conditioning unit in “Manual Mode” you can program maximum 10 steps in “Automatic Mode” (see figure 27 + 28)

If the elongation process is not running properly switch button “MOTORS ON” to “MOTORS OFF” and make small adjustments(see figure 63)

In case of an emergency “switch off” the conditioning unit at the rear right side to position (0) (see figure 64)

Figure 64