

LiftSuit User Manual

AUXIVO

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Purpose of these instructions

Thank you for purchasing the LiftSuit. The purpose of this document is to make you familiar with the installation and use of the LiftSuit, so that you can safely operate it. This documentation should therefore be regarded as an integral part of the LiftSuit.

Description of the user

These instructions are primarily intended for the end-user of the LiftSuit and secondary for the employer of the end-user. The end-user can be described as each person who interacts directly with the system. The end-user typically includes, but is not limited to:

- Installer
- Operator
- Maintenance personnel or technicians

The LiftSuit reduces the load on your back and hip muscles by equipping you with “external” back muscles. While the forces on your back and hip are not expected to increase when wearing the LiftSuit, as a precaution, people with health problems are not allowed to use the LiftSuit without prior consultation with a medical professional.

Everyone else can use the LiftSuit. However, you shall never conduct any work while wearing the LiftSuit that would not be considered safe to conduct without the LiftSuit, e.g. working with tools which are heavier than what you can handle. The LiftSuit does not make you immune to injuries.

All use of the LiftSuit shall only be carried out by an authorized and a properly qualified and skilled person of 18 years or older, who:

- Has read and understood this manual.
- Knows how to control this product.
- Is aware of all possible dangers and acts accordingly.

The required maintenance and inspection work, as stated in this instruction handbook, is allowed by the aforementioned persons, unless clearly indicated when this is not allowed.

WARNING

The LiftSuit shall not be used by people with health problems without prior consultation with a medical professional.

Getting started

Before you start using the LiftSuit yourself, or before you hand it out to be used in your company, we advise you to take the time and read the following sections of this handbook carefully.

While the LiftSuit is not a complicated piece of equipment, you will only benefit by using it correctly. It is a wearable device that can be connected to your body for hours. This will need some getting used to until it feels like a new natural way of working.

To get the maximum benefit from your LiftSuit, we recommend the following steps:

1. Learn how to put it on, and how to adjust it to your body size.
2. Learn how to activate and deactivate the support, and how to adjust the support level for your current task. Practice until you can use it intuitively without thinking about it.
3. Get used to it. Do not use it for eight hours per day from the beginning. Start with one hour per day and increase over time until it feels perfectly natural.

Conventions used in this manual

The following style conventions are used in this document:

Bold	<i>Italic</i>
Warnings	Cross-references

Explanation of safety warnings

DANGER

Danger indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.

WARNING

Warning indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.

CAUTION

Caution indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.

NOTICE

Notice indicates information considered important, but not hazard-related.

Product Safety Signs

WARNING

Please review all safety signs which are placed on relevant parts of the LiftSuit to indicate danger warning, pinch points, etc.

The following are safety signs, which are placed on relevant parts of the LiftSuit.



Read the manual

Retaining instruction handbook

WARNING

Read and understand this instruction handbook and its safety instructions before using this product. Failure to do so can result in serious injury or death. Keep all safety information and instructions for future reference and pass them on to subsequent users of the product.

Employers should make sure employees are informed or handed over these instructions. The manufacturer is not liable for cases of material damage or personal injury caused by incorrect handling or non-compliance with the safety instructions. In such cases, the warranty will be voided.

In case of any unclarities in the handbook, contact your supplier or Auxivo AG to avoid any misunderstanding and resulting risks.

Important information for the employer

Employers are responsible for providing a safe work environment for their employees. Therefore, they should always have conducted a task analysis, risk analysis and informed their employees about possible hazards, before they hand out the LiftSuit in their company.

Local laws related to occupational health and safety should always be followed.

Employers should make sure all end-users have the opportunity to get used to the LiftSuit, since it can cost time to get used to.

Information and support

The latest version of this document and other product information is available at www.auxivo.com.

To improve our customer experience, we appreciate your comments. They can be submitted on the support page of our website or sent to info@auxivo.com.

For questions, information about accessories and materials, technical assistance or ordering more instruction handbooks, please contact us:

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Intended use and reasonably foreseeable misuse

The LiftSuit is intended to be used as an exoskeleton that supports its' users' muscles. The LiftSuit is intended to support the back and hip, when lifting objects from below hip-level or working in a forward-leaning position. The LiftSuit is intended to support the user and reduce the workload, for example during repetitive lifting tasks or prolonged periods of forward leaning.

The LiftSuit is not a medical device. The LiftSuit is not intended to be used for any kind of medical application.

The LiftSuit is not intended to be used:

- To support other movements or other muscles than described above.
- To conduct any work that is not considered safe without wearing the LiftSuit.
- To support you during sports or other physical activities.
- As a safety harness or any kind of fall protection system.

The LiftSuit shall be used with original accessories and components only. Only use the LiftSuit within the specified performance limits and accordingly to the instructions as described in this instruction handbook. All use other than described in this handbook is seen as unintended use.

How the LiftSuit works

The LiftSuit is designed to support your hip and back muscles when bending forward or lifting loads below hip level. The back support module functions like an additional layer of back muscles on the outside of your body to reduce load on your own muscles. The LiftSuit reduces your back muscle activity by around 20% while lifting and leaning forward. When your muscles work less hard, the process of fatiguing can be slower.

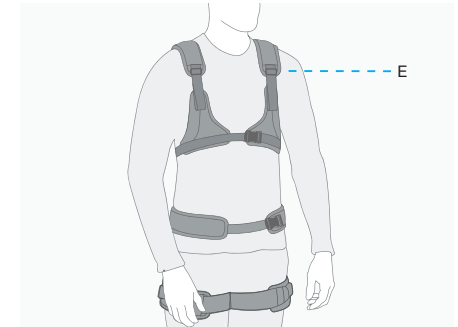
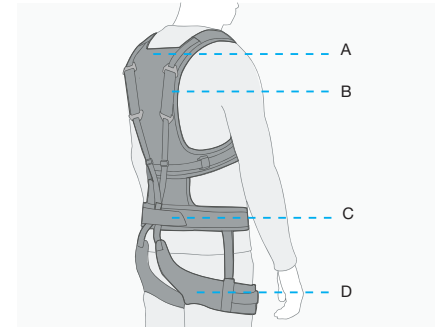
The LiftSuit features integrated elastic elements that store energy, which is then used to support the user and reduce the workload. It offers an easy-to-use, small, and lightweight (1 kg) support system. The back support can be activated and deactivated as required, and the support level can be increased and decreased manually to tune it to the current task.

When the LiftSuit is activated, it will support you each time you pick something up or while you remain in a forward-leaning position. Consequently, you will benefit the most from the LiftSuit back support if your work includes repetitive lifting tasks or prolonged periods in a forward-leaning position.

Product elements

The LiftSuit consists of five main elements:

- The vest that is connected to your upper body.
- The Elastic Energy Storages (EES) on your back that store your movement energy that is used to support you when working.
- The hip belt that secures the LiftSuit around your waist.
- The thigh cuffs that connect the LiftSuit to your legs.
- The activation mechanism that allows you to activate and deactivate the support.

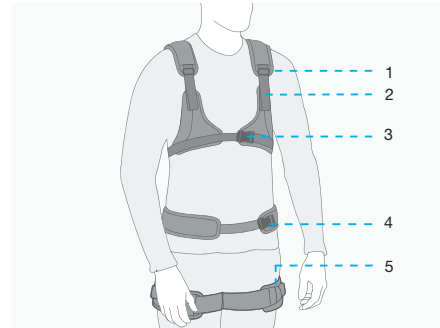
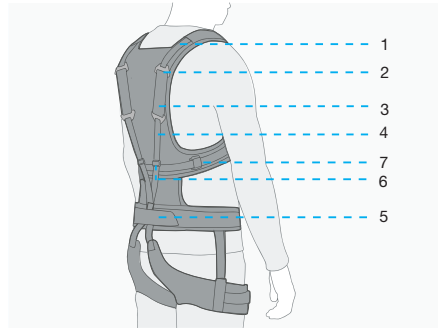


- Vest
- Elastic Energy Storages (EES)
- Hip belt
- Thigh cuffs

E. Activation mechanism

System components

For operation, maintenance and cleaning of the LiftSuit it is important to understand how and where to locate the individual components.



- Back view
1. Upper EES connecting strap
 2. EES hook
 3. EES elastic
 4. Lower EES connecting strap
 5. Strap guidance tunnel
 6. Back length adjustment buckle
 7. Chest circumference adjustment buckle

- Front view
1. Activation buckle
 2. Activation strap
 3. Chest adjustment and release buckle
 4. Hip belt adjustment and release buckle
 5. Thigh cuff adjustment and release buckle

Technical specifications

Device name	LiftSuit
Model	2
Technical life span	2 years
Size	S/M & L/XL Note: User selects LiftSuit size based on user's T-shirt size (S/M/L/XL) and should take into account thickness of clothes worn underneath.
Mass overall	0.9 kg (S/M) / 1.0 kg (L/XL)
Chest circumference	72 - 94 cm (S/M) / 87 - 115 cm (L/XL)
Hip circumference	69 - 100 cm (S/M) / 86 - 120 cm (L/XL)
Thigh circumference	49 - 63 cm (S/M) / 57 - 73 cm (L/XL)
Materials	Main fabric/ spacer mesh / lining: 100% Polyester
Ambient storage temperature	15 - 25°C (59 - 77°F)

Important safety information

⚠ DANGER

Read and understand this manual and its safety instructions before using the LiftSuit. Failure to do so can result in serious injury or death.

Do not operate the LiftSuit in explosive atmospheric conditions, such as in the presence of flammable liquids, gases or dust. Friction between LiftSuit materials may create sparks which may ignite the dust or fumes.

⚠ WARNING

Read and understand this manual and its safety instructions before using the LiftSuit. Failure to do so can result in loss of functionality, including loss of support, serious injury or death.

- Never conduct any work while wearing the LiftSuit that is not considered safe without wearing the LiftSuit.
- Do not use the LiftSuit if you have health problems without prior consultation with a medical professional.
- Do not use a damaged LiftSuit.
- Do not make any changes to the LiftSuit and its parts.
- Do not use the LiftSuit near flammable substances. The LiftSuit is not fire resistant.
- Keep the LiftSuit free of any liquids, sand, dust and debris.
- Keep the LiftSuit dry.
- Do not use the LiftSuit when clothing according to Electrostatic Discharge standard (EN 61340-5-1) is needed to protect electronic devices.
- Inspect each LiftSuit back Elastic Energy Storage monthly. Replace it when identifying damage.
- Do not use the back Elastic Energy Storage elements for more than one year or 150.000 cycles.
- Use the LiftSuit only for its intended purpose. For more information, see section 7 *Intended use and reasonably foreseeable misuse*.
- Do not do things that you would not do without the LiftSuit.
- Do not use the LiftSuit during work with a risk of falling forward.
- Do not wear the LiftSuit during work that requires the use of fall protection equipment. The LiftSuit is not a safety harness that protects you from falling. Put on the required fall protection before work.
- Make sure to use the correct size and that the LiftSuit is adjusted properly before every use. Safe and effective use of the LiftSuit relies on a proper fit to the body.
- Make sure that the LiftSuit is properly handled and stored, e.g. do not throw onto the ground or store in an enclosed space when damp or wet.
- Consider that the LiftSuit extends the body and can cause collisions with the environment.
- Do not place or carry any objects on top of any parts of the LiftSuit.
- Stop using the LiftSuit when experiencing signs of overheating, like heavy sweating, dizziness or fatigue.

⚠ CAUTION

Read and understand this manual and its safety instructions before using the LiftSuit. Failure to do so can result in discomfort or pain.

- Always use the LiftSuit with care.
- Make sure that the LiftSuit is adjusted properly before every use.
- Stop using the LiftSuit when experiencing discomfort or pain.
- Do not wear any tools below the LiftSuit.

What to do in case of an emergency and exceptional situations

NOTICE

Consult your facilities security officer to ensure internal compliance with all applicable regulations.

In case of an emergency:

- Do not remove the LiftSuit unless it is absolutely necessary.
- Make sure you are safe before assisting others.
- Follow your emergency plan.
- Get your emergency kit.

For questions or more information on how to use the LiftSuit safely in your company please contact your supplier or Auxivo AG.

Unpacking the LiftSuit

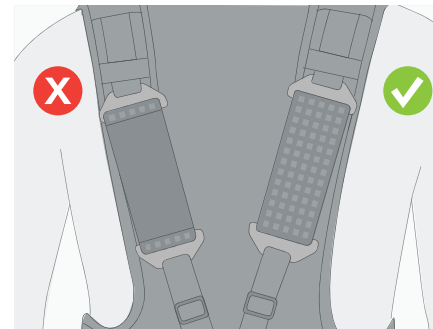
Unpack the LiftSuit. Dispose of the packaging and packaging waste in a correct manner.

Make sure that the package contains the following items:

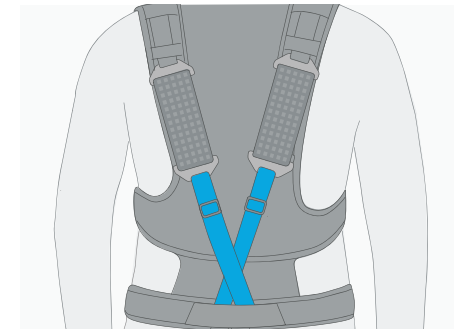
- LiftSuit exoskeleton
- User manual

Checking the LiftSuit

Check that the Back EES are mounted correctly in two steps:



Make sure the black-white patterned side of the elastics are facing you.



Check that the lower EES connecting straps cross above the hip belt. Make sure the EES connecting straps are not twisted.

Preparing the LiftSuit for use

⚠ WARNING

Check the LiftSuit for damages before putting it on.

Open all buckles and release all straps to the maximum length.

Preparation and Use

Putting on the vest, hip belt and thigh cuffs

⚠ CAUTION

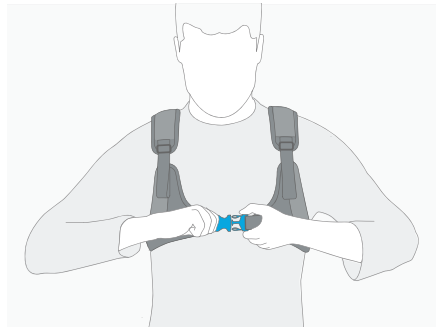
For safe and effective use, the vest should be correctly adjusted to the upper body.

Objective: to wear the vest and thigh cuffs comfortably and safely, with sufficient stability.

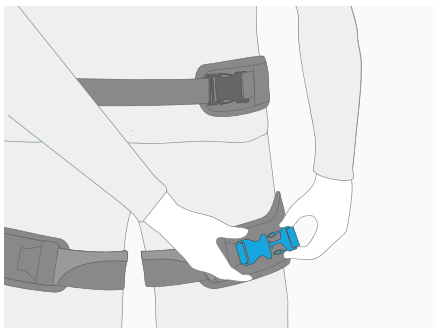
The vest should sit tightly on the upper body so that a slight pressure on the chest can be felt when inhaling. With outstretched arms, the edge of the vest should not press against the arms. The activation buckles should be at collarbone level.



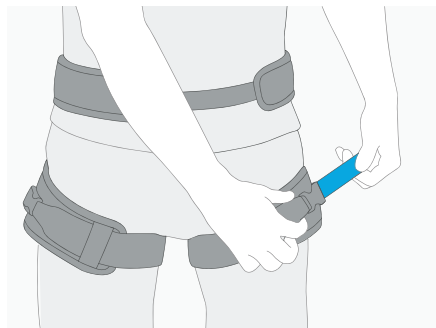
Put on the vest like a backpack.



Close the chest and hip belts buckles. They should be closed loosely.

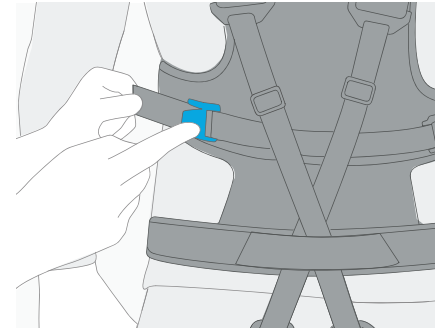


Close the thigh cuffs by locking the buckles.



Then tighten both thigh cuffs using the strap.

Preparation and Use



Tighten the vest at both side connections.

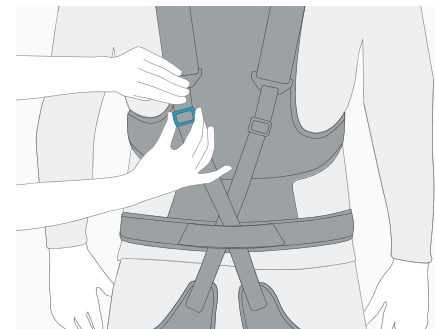


Then tighten the vest in the middle.

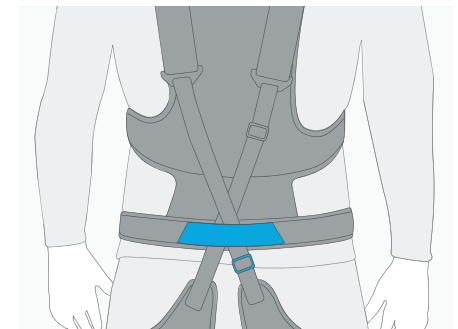
Adjusting the lower EES connecting straps

Objective: Adjusting the LiftSuit to your size to achieve an ideal fit and the best support effect with maximum comfort for the back.

For effective activation, both lower EES connecting strap lengths must be adjusted to fit your body height. Both straps must be symmetric. This adjustment is only needed for first-time use and may require assistance.



In an upright position, move the back length adjustment buckles up or down to adjust the length of both straps to your back length.



When adjusting, you may sometimes have to pass the buckles through the hip belt tunnel in the middle.

Check that both straps are symmetric. When properly adjusted, the straps should be relaxed, but not too loose. The straps should also not be too tight, such that the EES is stretched before activating the LiftSuit.

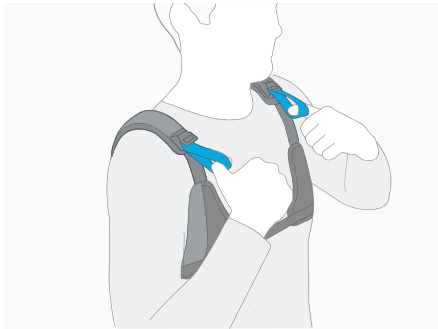
Activating and deactivating the back support

Make sure that you activate the LiftSuit when you want to receive hip and back support. The LiftSuit does not support your back when this module is not activated. Make sure to deactivate the LiftSuit back support module once you have finished your task.

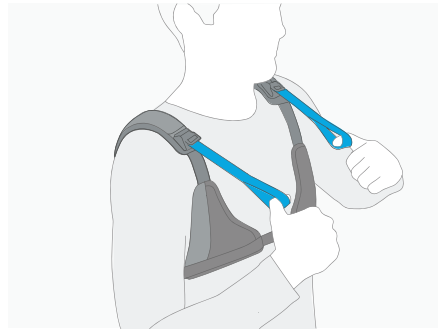
⚠ WARNING

To prevent limitations in movement, always deactivate the LiftSuit when the support is not required, e.g., while taking a break, driving a vehicle, or sitting.

Activating the back support:

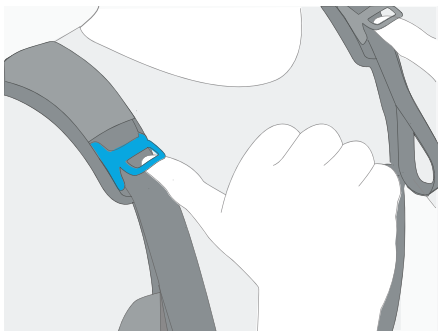


Put your thumbs in the loops of the activation straps.

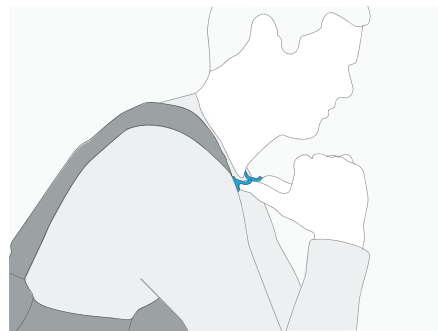


While standing in an upright position, pull the activation straps forward until you feel resistance.

Deactivating the back support:



To deactivate the back support module, lift the levers of the activation buckles with your thumbs.



With the levers of the activation buckles lifted, bend your upper body forward. The activation loops will slide through the activation buckle.

Checking and adjusting for an optimal fit

Objective: To wear the LiftSuit with an optimal fit, the best support effect, and maximum comfort.

- The vest should sit tightly on the upper body, but comfortable enough to allow for free movements and breathing. If it is too loose, tighten the chest belts on the side and in the middle further. If you feel any discomfort, loosen the chest belts slightly.
- Check that the activation buckles are placed at the level of the collar bone
- Check for pressure points or fricting at the base of your arms when you raise your arms in front of the body. If moving the arms in front of the body causes discomfort, loosen the chest belts at the sides and tighten the chest belt in the front.
- Make sure the thigh cuffs are tight but still comfortable to wear. The ideal degree of tightness of the cuffs is reached when a flat hand can be pushed between the thigh and the cuff without much effort.

When friction or pressure points occur during use, corrections can be made by readjusting the vest and thigh cuffs. This might be necessary especially during the first hour of use, when the LiftSuit “settles” after putting it on, or when you change your workplace, and you switch e.g. from standing work to working on your knees.

⚠ WARNING

Stop using the LiftSuit when experiencing signs of overheating, like heavy sweating, dizziness or fatigue.

Securing loose straps

⚠ WARNING

Use the safety thread-back loops to properly store each loose strap end to prevent clinging to protruding objects and getting stuck in moving parts, machines, or vehicles.

Ensure that all straps are guided through the thread-back loops. The thread-back loops should be positioned away from the buckle as far as possible.

Cleaning, Care and Maintenance

General care

- Always handle the LiftSuit with care.
- Avoid contact between sharp or piercing objects and the LiftSuit.
- Keep your LiftSuit clean from oil and chemicals that could damage it.
- Ensure that the LiftSuit is stored in a dry and ventilated place without direct sunlight.
- When working in environments with dust, dirt, or other small particles, clean after use.

Consumables

⚠ WARNING

The LiftSuit shall only be used together with, and never without, the original LiftSuit Elastic Energy Storages (EES) manufactured by Auxivo AG.

The Elastic Energy Storages (EES) are consumables that need to be replaced after 1 year in use. An EES shall also be replaced when wear and tear or other damages have been established (see section 7 Inspections).

Inspections

⚠ WARNING

Perform a visual inspection at least every 1 month to ensure proper function of the LiftSuit. Keep a log to record inspections. After identifying a possible problem, e.g. a damaged part, remove the LiftSuit from operation and contact your supplier or Auxivo AG for further assistance.

When something does not feel right while working, take off the LiftSuit and perform a visual inspection before continuing to use.

When the LiftSuit suffers from high impact force, such as falling on the ground, perform a visual inspection before continuing to use.

To conduct a visual inspection, check all the components in the list below:

Thigh cuffs

Check for signs of damage on the textile parts and the release buckles of the thigh cuffs.

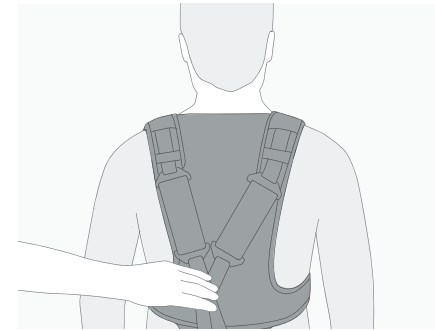
Elastic Energy Storage (EES)

Check for signs of abrasion or damage on front and back side of the EES.

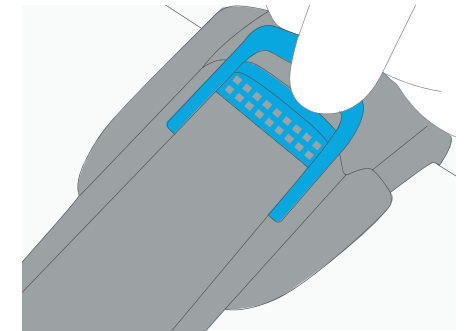
Cleaning, Care and Maintenance

Vest

Check for signs of damage to the vest textile, buckles, and straps.



Check for signs of excessive abrasion or damage on the main fabric of the vest underneath the EES.



Check the activation buckle for signs of damage to the activation buckle, e.g. worn-out spikes. Check that the activation buckle closes reliably.

⚠ WARNING

After identifying wear and tear or other damages, remove the LiftSuit from operations. If the affected part is the Elastic Energy Storages, replace this part of the LiftSuit as described in the section 7 Changing the Elastic Energy Storages. If another part of the LiftSuit is affected, contact your supplier or Auxivo AG for further assistance.

Changing the Elastic Energy Storages

The Elastic Energy Storages (EES) are consumables that need to be replaced after 150'000 cycles or 1 year in use (what is achieved first). A cycle is defined as a one-time tensioning and releasing of the EES during normal use (e.g. a normal lifting movement). An EES shall also be replaced when wear and tear or other damages have been established.

⚠ WARNING

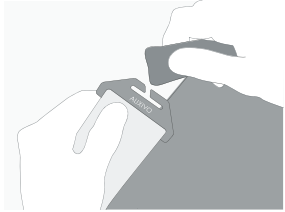
The LiftSuit shall only be used together with, and never without, the original Elastic Energy Storages (EES) manufactured by Auxivo AG.

Always remove the EES when washing or cleaning the LiftSuit. It is possible to swap the EES with a different (stiffer or softer) EES produced by Auxivo AG to adjust the support to your personal needs. For replacement parts or any issues, please contact your supplier or Auxivo AG.

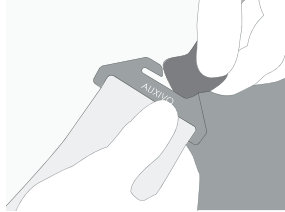
Please follow these instructions to attach, remove or replace the EES:

Attaching the back EES

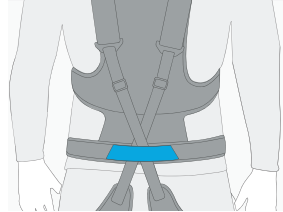
Take an original back EES. Make sure the black-white patterned side of the elastic is facing towards you.



Start by inserting the longer side of the EES hook into the loop of the upper connecting strap.

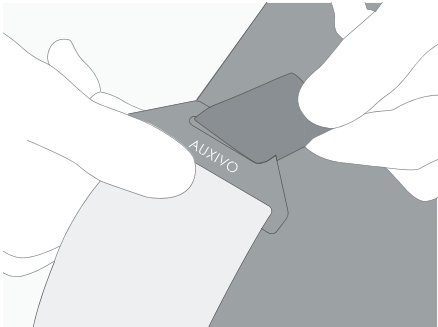


Then squeeze the loop onto the shorter side of the hook. Repeat the process for the lower connection and the other EES.

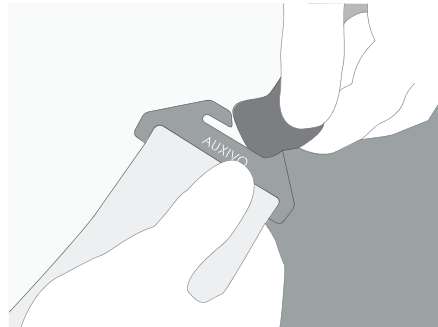


For the lower connection take the strap from the opposite thigh cuff. Make sure it runs through the hip belt tunnel. The lower connecting straps should cross at the user's lower back.

Detaching the back EES



Push the loop of the connecting strap to one side and pull it away from the EES hook.



When the loop slips out of the EES hook, pull it out. Repeat the process for the other connection on the other EES.

Check the EES placement according to the instructions in section 7 *Checking the LiftSuit*.

Cleaning the LiftSuit

NOTICE

Incorrect care can lead to damages.

Do not use an air gun to clean any parts of the LiftSuit.

To clean the LiftSuit, please follow these steps to prevent damage to the LiftSuit:

- Remove the EES prior to washing the LiftSuit, according to the instructions in section 7 *Changing the Elastic Energy Storages*.
- Close all release buckles of the vest.
- Put into a washing bag.
- Machine wash the textile components at 30°C. Do not use fabric softener. Use mild detergent. Wash separately. Only gentle spinning. Do not tumble-dry.
- Air dry the textile components. Make sure that it is fully dried before using it.
- Reattach back EES according to section 7 *Changing the back Elastic Energy Storages*.

After assembly inspect to ensure that all parts of the LiftSuit are correctly assembled for the next use, as described in section 7 *Checking the LiftSuit*.

Multiple users for one LiftSuit

WARNING

To ensure safety and comfort, the LiftSuit should be adjusted to every new user. Instructions on adjustment and customization can be found in chapter 7 *Preparation and Use*.

When the LiftSuit is being used by multiple users, the LiftSuit should be properly cleaned and washed in between users. Information on cleaning the LiftSuit can be found in section 7 *Cleaning the LiftSuit*.

Disposal

Dispose of the device and the packaging according to local regulation to avoid environmental and public health hazards. The packaging is made of environmentally friendly materials, which may be disposed of through your local recycling facilities. The recycling of materials contributes to the conservation of natural resources.

Legal Information

Liability

Auxivo AG cannot be held liable for:

- Personal injury or damage to property caused by not following the instructions and warnings in this handbook.
- Damage caused by changes and/or alterations to the LiftSuit.
- Wear and damage as a result of improper use.
- Damage caused by the use of non-original product parts, e.g. replacement parts.

Warranty

Auxivo AG warrants that the LiftSuit has the functions described in this handbook and is free from defects in material that eliminate or substantially reduce its functions upon delivery during a sending-in warranty period of 1 year. However, the LiftSuit also contains consumables (see section 7 *Consumables*) that must be replaced by the customer regularly at their own costs, depending on use and are not covered by the 1-year warranty period. If an LiftSuit has defects covered by the warranty, the supplier or Auxivo AG will replace the defective LiftSuit or defective parts of LiftSuit. This warranty shall be applicable only if the customer has inspected the LiftSuit and a claim pursuant to this warranty is made in writing to the supplier or Auxivo AG within 14 days after delivery stating the serial number of the defective LiftSuit, the date such LiftSuit was delivered and a description of the defect. Subsequently, the defective LiftSuit must be returned to the supplier or Auxivo AG.

No warranty is given in relation to LiftSuits that have been repaired or altered by anyone else than Auxivo AG, nor LiftSuits that have been subject to use contrary to this handbook, to negligence, to an accident or to misuse.

This warranty is in lieu of all warranties of Auxivo AG, express or implied.

For replacement parts or warranty issues, please contact your supplier or Auxivo AG.

Accessories and Spare Parts

List of Accessories and Spare Parts

(DEU) Zubehör- und Ersatzteilliste (ESP) Lista de accesorios y piezas de repuesto (FRA) Liste des accessoires et des pièces détachées (ITA) Elenco di accessori e ricambi (NLD) Lijst van accessoires en onderdelen (PRT) Lista de acessórios e peças sobressalentes

Name	Article Number
Pair of Elastic Energy Storage (EES)	Back-EES-Blue

EC Declaration of Conformity

EC Declaration of Conformity

(DEU) EG-Konformitätserklärung (ESP) Declaración de conformidad (FRA) Déclaration de conformité (ITA) Dichiarazione CE di conformità (NLD) Verklaring van overeenstemming (PRT) Declaração de conformidade

Manufacturer: Auxivo AG
Address: Sonnenbergstrasse 74
8603 Schwerzenbach
Switzerland



Product Identification Passive occupational exoskeleton „LiftSuit“

The product described above, as presented, complies with the provisions of the following directives:

2006/42/EG Machinery Directive

Conformity with the directives is ensured by applying the following harmonized standards:

2006/42/EG	EN ISO 12100	Safety of machinery - General principles for design - Risk assessment and risk reduction
	EN 1005-3+A1	Safety of machinery - Human physical performance - Part 3: Recommended force limits for machinery operation

Schwerzenbach, 25.01.2021
Ort, Datum

Dr. Volker Bartenbach
CEO Auxivo AG

Dr. Lijin Aryananda-Blatter
CTO Auxivo AG

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Issue: September 2023

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