



**IMPORTANT: Read Before Using
Operating & Safety Instructions for
SkelEx Mark 1.4.2**



Version 10

Date of issue: 30-10-2018

SAFETY INSTRUCTIONS

Read and understand all instructions. Failure to follow all instructions listed below may result in product failure or personal injury.

Work Area

Keep your work area clean and well lit. Cluttered benches and dark areas invite accidents.

Do not operate the exoskeleton in explosive environments, such as in the presence of flammable liquids, gases, or dust.

Keep by-standers, children, and visitors away while operating the exoskeleton. **Distractions can cause you to lose control**

Personal Safety

Stay alert, be mindful of what you are doing and use common sense when operating the exoskeleton.

Do not use the device while tired or under the influence of drugs, alcohol, or medication. Lack of attention while operating the exoskeleton may result in serious personal injury.

Dress appropriately. Do not wear loose clothing or jewellery. Contain long hair. Keep your hair, clothing, and gloves away from moving parts. Loose clothes, jewellery, or long hair can be caught in moving parts.

Keep attachment points dry, clean and free from oil and grease.

Do not overreach. Keep proper footing and balance at all times. Proper footing and balance enables better control of the exoskeleton in unexpected situations.

Use safety equipment. Always wear eye protection. Dust mask, non-slip safety shoes, hard hat, and hearing protection must be used if the conditions require.

Use and Care

Holding bulky work pieces with hand or against your body is unstable and may lead to loss of control.

Do not force the device . Use the correct tool for your application. The correct tool will do the job better and safer at the rate for which it is designed.

Check for misalignment or binding of moving parts, breakage of parts, and any other condition that may affect the exoskeleton operation.

If damaged, have the exoskeleton serviced before using. Accidents might be caused by poorly maintained exoskeletons. Use only parts that are recommended by the manufacturer for your model.

Service

Service must be performed only by qualified repair personnel. Service or maintenance performed by unqualified personnel could result in risk of injury.

When servicing the device, use only identical replacement parts. Follow instructions in the self-help section of this manual.

Use of unauthorized parts or failure to follow Maintenance Instructions may create a risk of injury. Certain cleaning agents such as may damage plastic, metal or textile parts.

Storage and Transportation

As the exoskeleton has textile and metal parts, it needs to be stored in a dry environment. Apply the same storage and transport approach for the exoskeleton that is recommended and used for any power tool.

When transporting the device, make sure that the arm supports are attached to the shoulder pieces – folded in and locked in place with a Velcro band to avoid damaging the environment.

Safety Precautions

Always ensure that the exoskeleton is correctly attached and secured to your body. Do not make movements that create uncomfortable pressure on any part of your body.

Always wear safety goggles or eye protection when using the exoskeleton.

Unstable support can cause the exoskeleton to bind causing loss of control and injury.

If you lose control, your arm or shoulder may get trapped and it may cause injury.

Avoid being caught in between the exoskeleton and walls or posts.

If one of the arm straps becomes detached, slowly move your arms down and reattach the Velcro band.

Do not grasp the exoskeleton or place your hands too close to the moving shoulder parts. Always be aware of the location of the exoskeleton's structural parts to avoid hitting your body or damaging external structures.

Textile parts may get dirty after prolonged use. Moveable parts could become entangled with clothing and injury may result, so use caution.

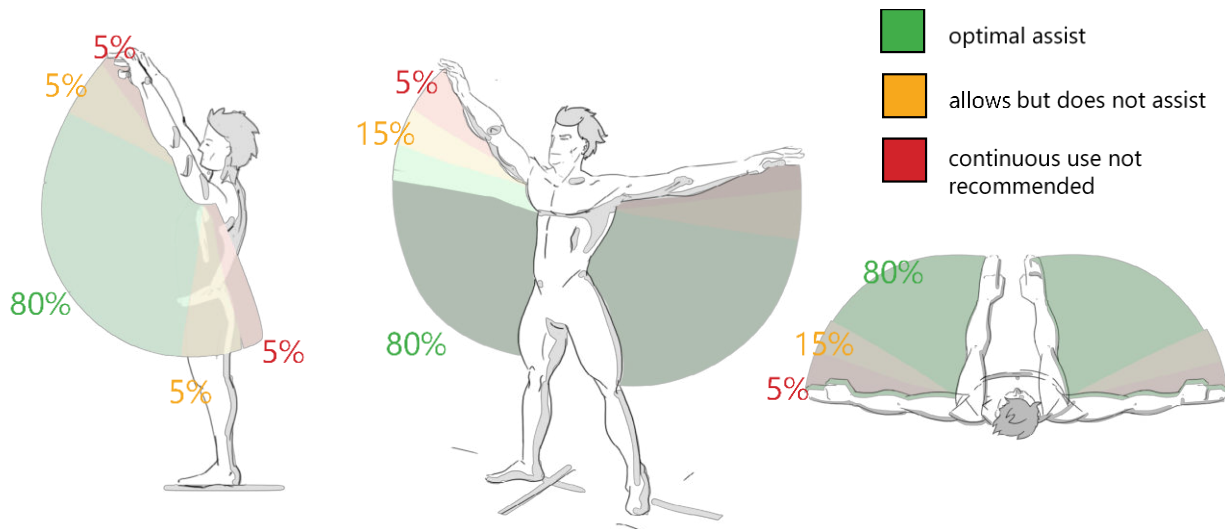
Avoid bouncing and snagging the exoskeleton. This can cause loss of control and kickback.

Make sure that the exoskeleton is correctly maintained. After every use, check for tears and/or damage. The cable tensions needs to be checked every week.

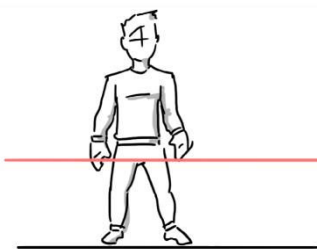
Height and width adjustments, as well as other moving parts, need to be checked every four weeks to ensure proper and safe functioning of the exoskeleton.

Range of motion

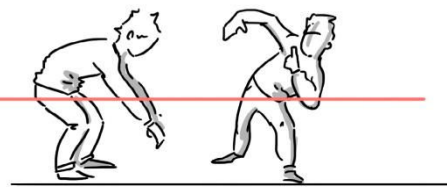
Graphs illustrate usable range of the SkelEx in terms of percentage of total human arm movement. SkelEx provides exceptional performance while working in the front assisting 80% of human movement range.



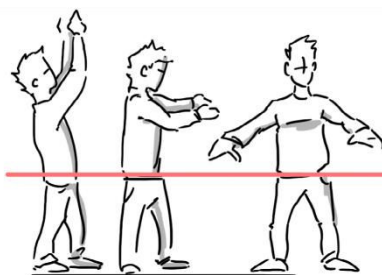
Recommended use



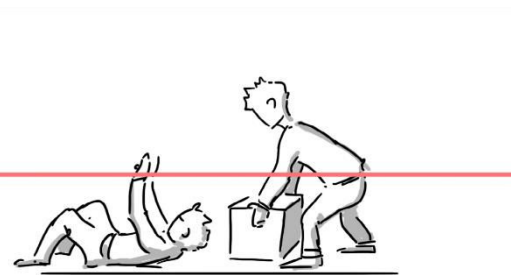
SkelEx is recommended to be used while working above the red line. It is specially designed for working standing upright.



SkelEx will not perform optimally, if the work involves continuous bending of the torso, either in the front or sideways.





Above picture illustrates postures that are ideally suited for working with the SkelEx to assist the workers.



SkelEx will not perform optimally if workers often need to lay down on their back or pick up things from the floor.

FUNCTIONAL DESCRIPTION

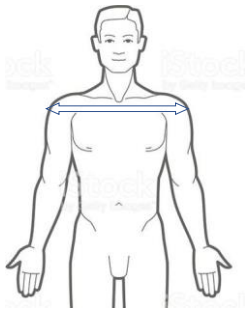
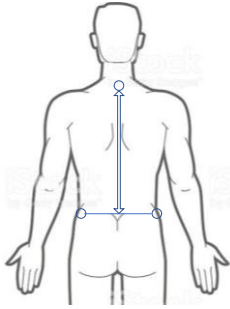
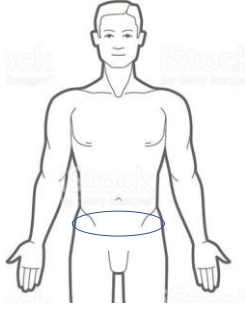
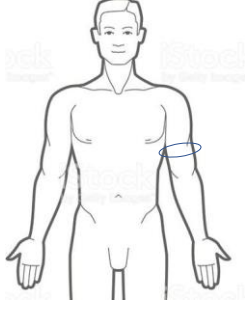
Rear view	Legend	
	No	Description
	1	Width Adjustment
	2	Arm cup
	3	Arm cover
	4	Arm strap
	6	Flexframe
	7	Height Adjustment
	8	Hip belt

Front view	Legend	
	No.	Item
	9	Hinge with force adjustment
	10	Hinge cover
	11	Cable
	12	Shoulder strap
	13	Chest strap

Technical Specifications

SkelEx height	480-530 mm.
SkelEx width	390-450 mm.
SkelEx weight	3.95 kg.
SkelEx total lifting capacity	Stepless 0.0 – 8.0 kg.
SkelEx lifting capacity per arm	Stepless 0.0 – 4.0 kg.

SKELEX SETTINGS & BODY MEASUREMENTS

Body measurements		SkelEx settings	
Shoulder width (cm)		Width setting	
	<43	<input type="radio"/>	<i>Out of range, try S</i>
	43-45	<input type="radio"/>	<i>S</i>
	45-48	<input type="radio"/>	<i>M</i>
	48-51	<input type="radio"/>	<i>L</i>
	51-54	<input type="radio"/>	<i>XL</i>
	>54	<input type="radio"/>	<i>Out of range, try XL</i>
Torso length (cm)		Height setting	
	<44	<input type="radio"/>	<i>Out of range, try highest position</i>
	44-47-	<input type="radio"/>	
	47-51	<input type="radio"/>	<i>Halfway height</i>
	51-54	<input type="radio"/>	
	>54	<input type="radio"/>	<i>Out of range, try lowest position</i>
Pelvic circumference (cm)		Hip belt	
	84-124	<input type="radio"/>	<i>Standard belt</i>
Upper arm circumference (cm)		Arm cup	
	20-42	<input type="radio"/>	<i>Standard arm cup</i>

Continuous use of the SkelEx 1.4.2 is not advised if the SkelEx cannot be fitted correctly or if more than one body dimension does not fit in the chart.

OPERATING INSTRUCTIONS

Warning !



Avoid getting your fingers caught between the hinge and moving parts and between the lever arm and cable.

1.



If you are right-handed, hold the Skelex by the right shoulder strap with your right hand. Control tilting with your left hand. Vice versa if you are left-handed.

2.



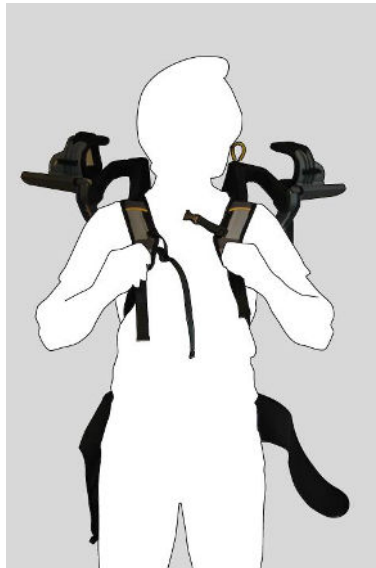
Put on the right shoulder strap like a backpack. While continuing to hold the belt with the left hand to ensure the exoskeleton does not hit your head.

3.



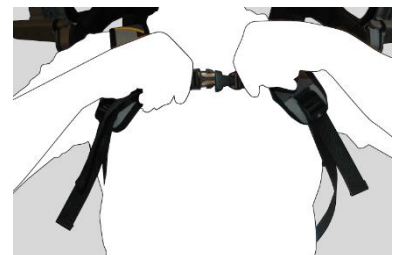
Put on the left shoulder strap, again ensuring that the arms or the rest of the exoskeleton does not hit your head.

4.



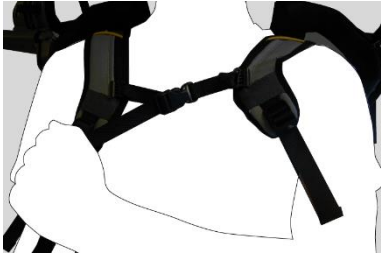
Position the exoskeleton vertically on your back by slightly pulling both shoulder straps up and over your shoulders.

5.



Connect the chest strap to affix the harness closely to the torso.

6.



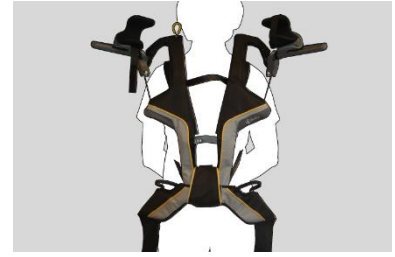
Position and tighten the chest strap to ensure that the shoulder straps are on the ventral part of your chest, and not in your armpits.

7.



Tighten the shoulder straps to ensure that the harness fits snug on your body.

8.



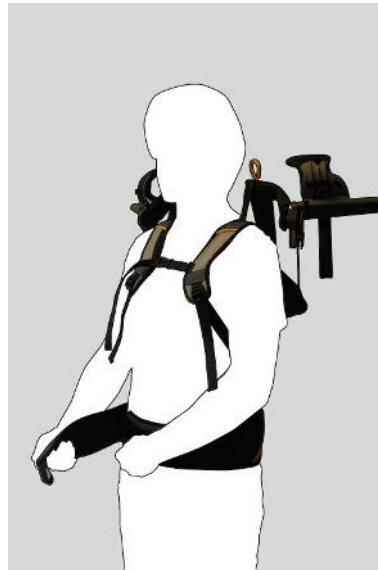
Check to ensure the vertical orientation of the exoskeleton on your back.

9.



Adjust the height of the hip belt by pulling the two loops on the belt outward. Position the hip belt at a comfortable position on your pelvic bones and release the loops.

10.



While pulling the hip belt halves forward, secure the hip belt close using the Velcro for a snug fit.

11.



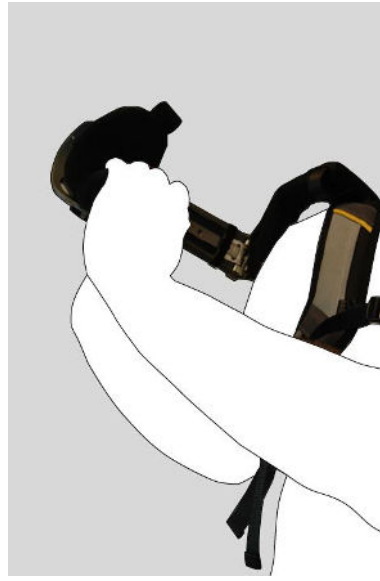
Lift arms up to check for comfort of the frame and freedom of movement from arms and torso.

12.



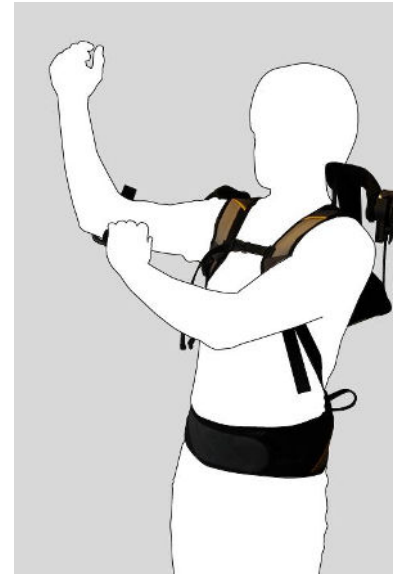
Place your left hand in right armpit to hold back clothing. Use your right hand to grab the right arm cup and carefully push it upward and forward.

13.



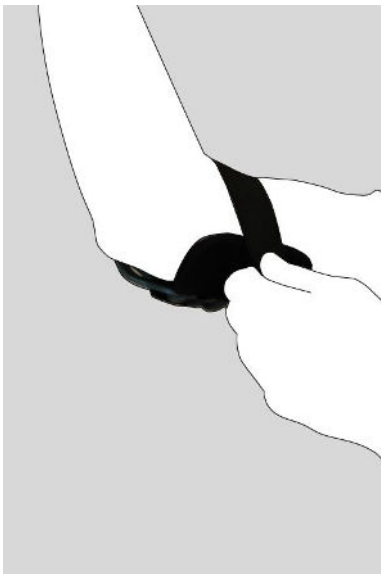
With your left hand, grab the lower part of the right arm cup and keep carefully pushing the arm cup forward. Do not let go!

14.

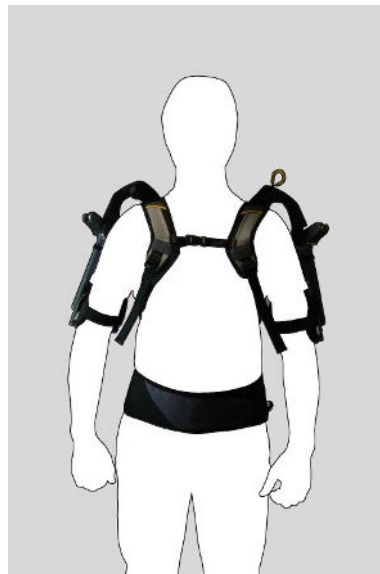


Carefully place your right upper arm in to the right arm cup.

15.

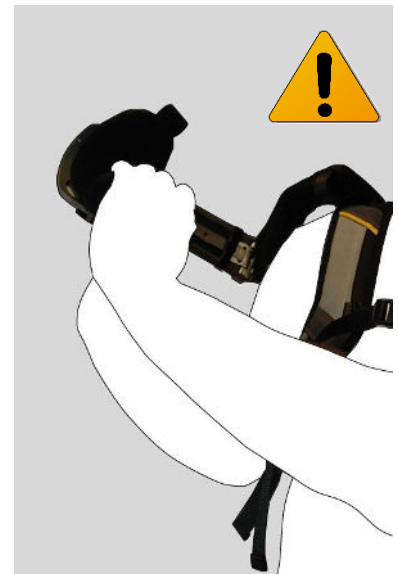


Carefully ensure that the right arm is fixated inside the right arm cup. Lock the arm strap in place with little stretch tension. Redo steps 12, 13, 14 and 15 for your left arm.



For taking off the exoskeleton, follow the steps in reverse, but ensuring the sequence! Therefore, start with carefully releasing the arm cups one-by-one, then the hip belt and finally the chest strap!


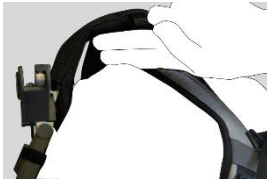

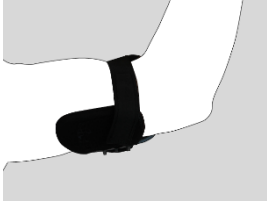

Caution !




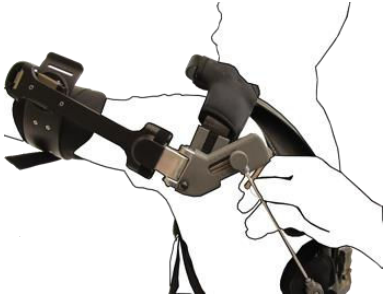

Be aware of the spring loaded nature of the SkelEx. Uncontrolled releasing the arm cup can result in injury.

CHECKING AND ADJUSTING FIT OF THE SKELEX ON THE USER

Now that the user has the SkelEx on, check the fitting of the SkelEx. It is important that there is sufficient space between the shoulder of the user and the shoulder piece of the SkelEx. The hip belt should fit comfortably on the pelvic bones (or on top of user's belt). To check and adjust the fit, follow the steps below. Only continue if sizing and fitting is correct.

	<p>The SkelEx should be centred <u>vertical on the back</u> of the user.</p> <p>The hip belt must be comfortably tight around the pelvic bones.</p> <p>The chest strap must be fixed and adjusted, such that the shoulder straps are not in the armpit.</p> <p>The shoulder straps must be comfortably tightened to <u>avoid tilting</u>.</p>	
1.	<p>With arms of user relaxed at the sides of the body, there should be 2 to 3 finger-thickness space between the human shoulder and shoulder piece.</p> <ul style="list-style-type: none"> No: To decrease space, loosen shoulder straps To increase space, tighten shoulder straps Yes: Continue to next step. 	
2.	<p>With arms of user relaxed at the sides of the body, there is 1 finger thickness space between human shoulder and SkelEx hinge.</p> <ul style="list-style-type: none"> No: Decrease the shoulder width setting to decrease space, Increase shoulder width setting to increase space, Space is still incorrect, refer to trouble shoot Yes: Continue to next step. 	
3	<p>With arms horizontal in front and elbows bent 90°, the arm cup must be positioned at the end of the slider rail and with the side of the arm trap just touching the elbow crease.</p> <ul style="list-style-type: none"> No: Undo the arm strap, reposition the arm cup to the end of the slider and reposition the arm in the arm cup and close the arms trap. Yes: Continue to next step. 	
4	<p>The SkelEx hip belt fits comfortable on the pelvic bones.</p> <ul style="list-style-type: none"> No: Loosen the SkelEx hip belt and adjust height setting and tightness to improve hip belt comfort. Still incorrect space, refer to trouble shoot. Yes: Continue to next step. 	

Adjusting the support force

<p>1.</p>  <p>Lift your arms while wearing the Skelex. For easy adjustment make sure the cable and the lever arm are perpendicular.</p>	<p>2.</p>  <p>Unlock the adjustment lever</p>	<p>3.</p>  <p>Higher force</p> <p>Lower force</p> <p>Rotate the lever clockwise for a higher force. Rotate the lever counter clockwise to lower the force.</p>
--	--	---

In case of Malfunction

In case of damage or malfunction,
contact your dealer or client service via mail or phone

SkelEx B.V. Scheepsbouwweg 8, Kavel 4G
3089 JW Rotterdam
+31 641 543 841
info@skel-ex.com

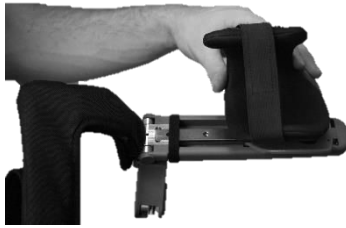
Daily or pre-use checks

1.



Ensure that the arm cover is secure and in place.

2.



Check if the arm support slides smoothly over and stops at the right position.

3.



Check the integrity of the hinge by wiggling it slightly.

4.



Check the integrity of the cable and lever arm connection.

5.



Check the cover of the hinge and ensure that there are no loose parts.

6.



Check the integrity of the cable base.

7.



Check Width Adjustment System range and locking. Check the adjustable strap at the back of the SkelEx between the two frame halves.

8.



Check play between the two halves of the frame.

9.



Check Height Adjustment System range and locking. Pull both loops outward and move the belt up or down.

MAINTENANCE INSTRUCTIONS

CLEANING INSTRUCTIONS

Instructions: Clean with damp towel with light detergent.

Cleaning Fabrics



Arm Cup Fabric

If washing of the fabrics is required, the fabrics of the arm cups can be removed from the SkelEx.

- 1. Removal** Loosen the Velcro straps and pass these through the slots in the plastic arm cup. The arm cup fabrics with padding can be slid off the arm cup.
- 2. Washing** The padding must be removed from the arm cup fabrics prior to washing the fabrics.

Max 30 °C, little detergent and lay flat to dry.

It is advised to wash the fabrics inside a washing net.
- 3. Reinstalling** Re-insert the arm cup padding in the arm cup fabrics, distinguishing the left from the right padding and fabrics.

Make sure the padding does not curl inside the fabrics and assure the Velcro inside the fabrics is locked on the Velcro on the padding.

Slide the matching arm cup in the fabrics, route the Velcro strips through the slots and lock onto each other.

Hip Belt Fabric

If washing of the fabric is required, the fabric of the hip belt can be removed from the SkelEx.

- 1. Removal** Open the cover of the height adjustment system and undo the four Velcro straps. By folding the padded part of the belt, the fabrics can be slid off.
- 2. Washing** Max 30 °C, little detergent and lay flat to dry.

It is advised to wash the fabrics inside a washing net.
- 3. Reinstalling** Fold the belt padding and slide belt fabrics on the correlating padding.

Fix the fabrics by routing the Velcro strips through the slots and fixing these on the belt.

Harness

If washing of the fabrics is required, the harness fabrics can be removed from the SkelEx.


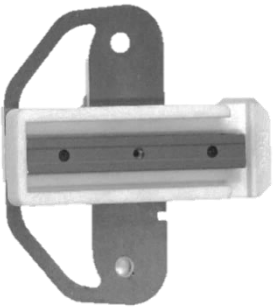
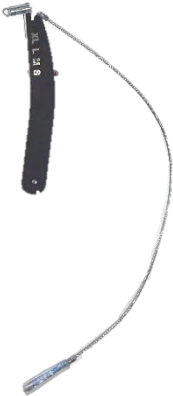


1. Removal
 - On both shoulder pieces, undo the Velcro strips and route these through the slot in the shoulder piece.
 - Undo the stretch fabric from the shoulder parts and release and undo the zippers all the way.
 - Undo the fabric from the shoulders and springs.
 - Pry open all the Velcro on the centre of the harness.
 - Slide the fabrics downward from the frames and note how the harness is removed from the springs.
2. Washing
 - Prior to washing, close the chest strap and attach the narrow Velcro straps to the shoulder fabrics.
 - Max 30 °C, little detergent and lay flat to dry.
 - It is advised to wash the fabrics inside a washing net.
3. Reinstalling
 - First undo all the Velcro on the centre of the harness and place the harness on the front face of the frame as it was removed but don't pull over the shoulders yet.
 - First put the fabrics around the bottom part of the frame, then pull the harness over the springs and the shoulder..
 - Route the narrow Velcro strips through the shoulder piece and the holes in the shoulder fabrics.
 - Pull the flexible part of the shoulder fabrics over the metal shoulder piece and tighten and fix the narrow Velcro strap.
 - Pull the flexible part of the shoulder fabrics over the metal shoulder piece and tighten and fix the narrow Velcro strap.

Cleaning Metal Parts

Clean with damp towel with light detergent and dry with clean towel.

Clean arm rails with clean dry towel and lube with PTFE/Teflon.

PART CODE AND DESCRIPTION Skelex Mark 1.4.2

Part No.	Description Subassembly	Photo	Part No.	Description Subassembly	Photo
200-0044	Harness		100-0003	Belt	
100.0007	Height Adjustment System		200-0059	Width Adjustment Strap	
Left: 100-0008 Right 100-0009	Arm assemblies				
100-0011	Frame Assembly Left		100-0012	Frame Assembly Right	



Skel-Ex

📍 Scheepsbouwweg 8 - G4 ✉ info@skel-ex.com

3089 JW

Rotterdam

Netherlands

+31 641543841

www.skel-ex.com