

SkyBrace Series

PRODUCT USE & SAFETY

SKB-75Kips



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SKB-75Kips

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This Manual

This manual is intended as a basic source of information on the safe use and maintenance of InnovaTech Manufacturing's SkyBrace Series. This manual provides general information as well as specific warnings, instructions, and information that users of this product must read, understand, and follow.

This manual is not intended as an all-encompassing "rule-book" on use safety. Instead, InnovaTech Manufacturing presents this information as a reference and guide only. It is the purchaser's and user's responsibility to identify specific safety hazards and determine proper procedures to prevent those hazards from inflicting injury.

Safety is paramount in the use of this product. A copy of this manual should be made available to all persons using this product. This manual is available online at <https://innova.tech>.

All information in this manual is based on the latest product information at the time of publication. However, there may be design improvements from time to time so that photographs, text, and sketches within the body of this manual may not exactly match your product. InnovaTech Manufacturing's responsibility, financial or otherwise, for any consequences arising out of the use of this manual or its products is limited by our product warranty. The information contained herein is subject to change, and revisions may be issued to advise of such changes. InnovaTech reserves the right to make product changes at any time without obligation.

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If you have any questions or concerns about the content of this Product Use and Safety Manual or, if you would like to request updated information, we want to hear from you.

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The InnovaTech SKB-75Kips, also known as SkyBrace, is protected under US Patent pending.

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Table of Contents

Document Information	II
Revision Log	II
This Manual	II
1. Overview	2
Nomenclature.....	3
2. Specifications	4
2.1 General	4
Dimensions	4
Weight	4
Capacity	4
Support Cables	4
Fasteners.....	4
Connectors	4
Brackets.....	4
Structure Brackets	4
Anchor Brackets	4
Anchors.....	4
Adjusting Equipment.....	4
2.2 Fastener Specs.....	5
3. Safety	6
3.1 Safety Alerts	6
3.2 Addressing Hazards	6
A. Wind and Weather.....	6
C. Crush/Pinch Points.....	7
D. Defective Equipment.....	7
4. SkyBrace Assembly.....	7
4.1 General	7
One-Span SkyBrace	7
Two-Span SkyBrace	7
4.2 Fasteners, Connectors & Brackets	8
Fasteners.....	8
Connectors	8
Structure Brackets	8
Multi-Anchor Bracket Nomenclature.....	9
5. SkyBrace Installation.....	9
Installation Plan	9
5.1 Pre-Installation	9
5.2 Installation	9
Bracing against Concrete	9
Footing Bracket Connection	9
Bracing Against Ground	10
Single and Multi-Anchor Bracket Connection	10
5.3 Adjusting the SkyBrace	10
Adjustable Slip Connector	10
Adjustable Slip Connector Nomenclature..	10
Adjustable Threaded Connector	10
Adjustable Threaded Connector Nomenclature	10
5.4 Post-Installation Inspection	11

5.5 Take-Down and Disassembly.....	11
Take-Down	11
Disassembly	11
6. Transport and Storage.....	11
6.1 SkyBrace Crate.....	11
6.2 Stow	11
6.3 Preparing for Transport	11
7. Inspections and Maintenance	12
7.1 Periodic Inspection	12
Periodic Inspection Checklist.....	12
7.2 Annual Inspection and Repairs	12
7.3 Modifications	12
Appendix A: Decals and Labels.....	13

Document Information

1. Overview

2. Specifications

3. Safety

4. Operation

5. Transport and Storage

6. Maintenance

Appendix

1. Overview

The InnovaTech SkyBrace is a temporary structural support brace usually used to stabilize sections of wall construction in steel building erection. As a general rule, multiple Skybraces are used at a time.

A SkyBrace is a 40-foot TubeSpan which can be doubled in height by bolting two 40-foot TubeSpans together. By design, the SkyBrace features three folding Struts at one end of a TubeSpan with a Wire Rope running from each Strut and attaching to the opposite end of the TubeSpan.

Components are an integral part of the SkyBrace. These components are: Top Connectors, Base Adjusting Connectors, Structure Brackets, and Anchor Brackets. Connectors are detachable, but generally stay bolted to the TubeSpans. Brackets, however, are interchangeable depending on the bracing requirement.

For shorter structures, the Struts and Support Cables remain secured to the TubeSpan. Joining two TubeSpans together for bracing taller structures requires that the struts be fanned away from the TubeSpans and bolted to each other. This straightens the Wire Ropes preparing them for tensioning.

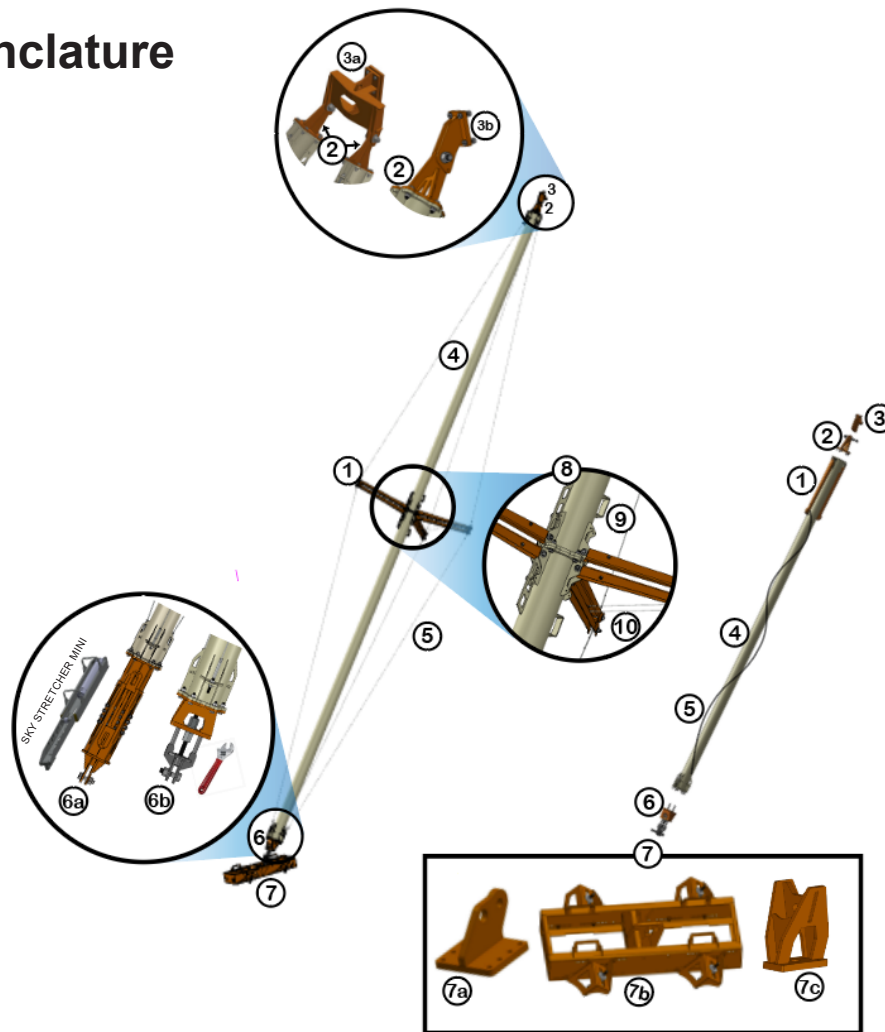
Top Connectors join a SkyBrace to one of two Top Brackets: the Single Leg Structure Bracket or the Double Leg Structure Bracket. The Structure Brackets connect a SkyBrace to the structure.

Base Connectors are adjustable and require an adjusting mechanism for fine-tuning the brace length. Base Adjustable Connectors join SkyBraces to one of three types of anchoring brackets.

The Footing Bracket is used to anchor a SkyBrace to a concrete footing. The Single Anchor Bracket and the SkyBase 100 are used to join a SkyBrace to pre-installed ground anchors.



Nomenclature



1. Cable Strut (qty 3) - Folded in for one span bracing; folded out for two span bracing
2. Top Connector - Fastening Component between Tube Spans and Top Brackets
3. Structure Bracket- Component that fastens a SkyBrace to a structure
 - a. Double Leg Structure Bracket
 - b. Single Leg Structure Bracket
4. TubeSpan - Steel tube that is the main brace
5. Support Cables (qty 3) - Wire Ropes that add rigidity to Tube Spans
6. Base Connectors - Fastening Components between Tube Spans and Base Brackets
 - a. Adjustable Slip Connector - Adjusted with the Mini Sky Stretcher
 - b. Adjustable Threaded Connector - Adjusted with a large wrench
7. Anchor Brackets - Components that anchor SkyBraces to the ground
 - a. Footing Bracket - For anchoring to concrete
 - b. Multi-Anchor Bracket (SkyBase 100) - Anchored per engineer requirement
 - c. Single Anchor Bracket - Anchored per engineer requirement
8. Hoist Points - Points on Tube Spans for crane hoisting
9. Lift Points - Points on Tube Spans for telehandler lifting
10. Strut Cables - Wire ropes between Struts to hold Struts in place



2. Specifications

2.1 General

Dimensions

Length	
One-Span Brace (also shipping mode)	36.5 ft
Two-Span Brace	73 ft
Width	
One-Span Brace	20 in
Two-Span Brace	9 ft-10 in
Height	
One-Span Brace	20 in
Two-Span Brace	11 ft-8 in

Weight

One-Span Brace	1880 lbs
Two-Span Brace	3682 lbs

Capacity

One-Span Brace	75 Kips
Two-Span Brace	75 kips

Support Cables

Main Cables	72.574 ft
Strut Support Cables	89 in.
<i>Original Model</i>	
Between Side Struts	(qty 2) 9 ft. 9 ³ / ₈ in.
Between Bottom Struts	(qty 1) 7 ft. 3 ³ / ₄ in.

Fasteners

..... See Chart (pg 5)

Connectors

Top Connectors	158 lbs
Adjustable Threaded Connector	294 lbs
Adjustable Slip Connector	507.78 lbs

Brackets

Structure Brackets

Single-Brace to Structure Bracket	85 lbs
Dual-Brace to Structure Bracket	650 lbs

Anchor Brackets

Footing Bracket	148 lbs
Single Anchor Bracket	135 lbs
Multi-Anchor Bracket	526.84 lbs

Anchors

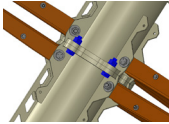
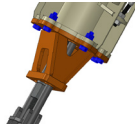
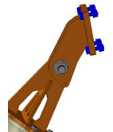
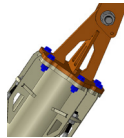
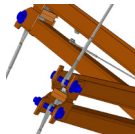
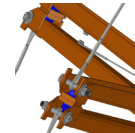
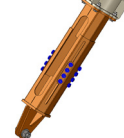
..... per engineer spec

Adjusting Equipment

Sky Stretcher Mini	for slip connector
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2.2 Fastener Specs

Fastener Specifications				
Connection	Description	Location	Size	Torque
TubeSpan to TubeSpan	A325 Standard Bolt (PT) With heavy hex nut and washer		1-8 x 4 in.	300 - 500 ft/lb
TubeSpan to Base Tube Bracket	A325 Standard Bolt (PT) with heavy hex nut and washer		1-8 x 4 in.	300 - 500 ft/lb
Top Bracket to Structure	A490 Structural Heavy (PT) with Structural heavy hex nut and washer		1-8 x 4L	300 - 500 ft/lb
TubeSpan to Top Tube Bracket	A325 Standard Bolt (PT) with heavy hex nut and washer		1-8 x 4 in.	300 - 500 ft/lb
Strut Cable to Strut	A325 Standard Bolt (PT) with heavy hex nut and washer		1-8 x 5.5 in.	150 - 200 ft/lb
Strut to Strut	A325 Standard Bolt (PT) with heavy hex nut and washer		1-8 x 3.5 in.	300 - 500 ft/lb
Slip Bolts	A325 Standard Bolt (PT) with heavy hex nut and washer		1-8 x 3 in.	625 ft/lb
MasterBolt	A449 Grade 5 Standard Bolt (PT) with heavy hex nut and washer (or A325 equivalent)		2-4.5 x 7 in.	Snug Tight
Footing and Anchor Brackets.	Reference bracing plan	Reference bracing plan	per engineer spec	per engineer spec



3. Safety

3.1 Safety Alerts

Hazard Level	Signal Word	Signal Color	Signal Symbol	Signal Example	Signal Meaning
Extreme	DANGER	RED			DANGER indicates a hazardous situation which, if not avoided, WILL result in death or serious injury.
High	WARNING	ORANGE			WARNING indicates a hazardous situation which, if not avoided, COULD result in death or serious injury.
Medium	CAUTION	YELLOW			CAUTION indicates a hazardous situation which, if not avoided, MAY result in moderate injury.
Low	CAUTION	YELLOW	no symbol		CAUTION (without a symbol) indicates a hazard or practice not related to personal injury.

3.2 Addressing Hazards

Installation and take-down of SkyBraces involves an environment in which many hazards exist. Workers in the vicinity of SkyBraces should exercise safety precautions and awareness in the fall zone. They must also be cautious and aware of crush points, pinch points, and overhead lines. Weather conditions must also be very carefully considered.

WARNING **IMPAIRMENT!** DO NOT attempt to inspect, install, or remove the SkyBrace equipment if you are using drugs, alcohol or any medication that might impair your judgment or alter your ability to respond properly to hazards.

A. Wind and Weather

Do not install or remove SkyBraces during weather events with high risk. Do not attempt to install or remove SkyBraces during high wind or lightening storms.

B. Overhead Lines

Keep SkyBraces away from high voltage conductors. SkyBraces are not electrically insulated. Be aware of the hazard.

- Follow safe Minimum Approach Distance (MAD).

- Allow for electrical wire sway.
- Assume wires are energized unless known otherwise.

Minimum Safe Approach Distance (MAD)	
Voltage Range (Phase to Phase)	Minimum Safe Approach Distance
0-300V	Avoid Contact
Over 300V to 50 kV	10 feet
Over 50 kV to 200 kV	15 feet
Over 200 kV to 350 kV	20 feet
Over 350 kV to 500 kV	25 feet
Over 500 kV to 750 kV	35 feet
Over 750 kV to 1000 kV	45 feet

Requirements of the MAD Table apply except where employer, local, or governmental regulations are more stringent.



If any part of a SkyBrace contacts a high-voltage electrical conductor, the entire Brace and any equipment or structure connected to it can become electrically energized. If that happens, do not come in contact with a SkyBrace, the operating equipment, or any other structure or object connected with a SkyBrace. Such contact could result in death or serious injury. Warn personnel in the vicinity to stay away.

⚠ DANGER

ELECTROCUTION HAZARD!

The SkyBrace is not insulated and does not provide protection from electrical shock. Death or serious injury could result from contact with an energized conductor. Regard all conductors as energized.

C. Crush/Pinch Points

Workers must stay out from underneath the load. Workers in the fall zone beware of crush hazards. Keep hands and feet clear of attachment points while setting a SkyBrace.

D. Defective Equipment

If any part of a SkyBrace is damaged, remove it from service. If the cables show any signs of wear they must be replaced before a SkyBrace can be used.

4. SkyBrace Assembly

4.1 General

Assembling SkyBraces requires a large work area and the use of heavy machinery. Tube Spans are long and heavy. Connectors and Brackets weigh hundreds of pounds. The total weight of a two span SkyBrace, including components, is 3,682 lbs. (See Specifications p. 4)

If a bracing plan is provided, reference it for the length of Skybraces needed and for anchor brackets.

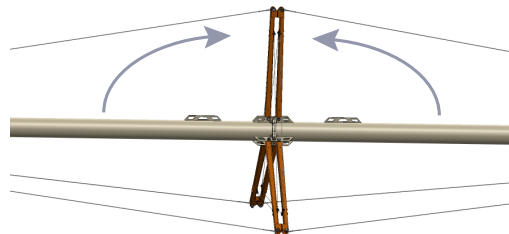
Once it has passed Inspection, the Single-Span SkyBrace is ready for installation.

Two-Span SkyBrace

1. Clean the mating surface of Cable Strut end of two Tube Spans.
2. Align bolt hole patterns on the Cable Strut ends of each of the Tube Spans and bolt the two Tube Spans together.



3. Release strapping from Strut Support Cable along each Tube Span. **(The original model SkyBrace has support cables between each of the struts. The current model SkyBrace has strut cables between the bottom struts only.)**
4. Fan the Struts. This brings the struts from the two Tube Spans toward each other creating three sets of two Struts.



One-Span SkyBrace

1. Leave Struts folded in.
2. Keep Strut Support Cables secured against TubeSpan.
3. Use Specified bolts to fasten Top and Base Tube Brackets. (See Specifications chart)
4. Choose appropriate Structure Bracket and fasten with specified fasteners.
5. Fasten appropriate Anchor Brackets.
6. Inspect the SkyBrace.
 - Assure all nuts and bolts are secure. Make sure they are properly torqued.
 - Inspect the Tube for damage. Check welds. Check for dents and cracks.

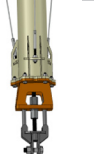
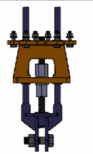
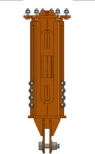
5. Bolt Struts together.
6. Tensioning support cables: Tension all three support cables until the SkyBrace center



(where the tube spans connect) bows 1.5 inches downward. **Do not exceed a 1.5 inch downward bow of the SkyBrace.** (Bowing the skybrace downward ensures the proper support cable tension. Because of the downward bow, SkyBrace compression loads are shared between the bottom two support cables. (See diagram on page 7.)

7. Stage the Two-Span SkyBrace by setting it on the lower two struts. The hoist points should be on the top.
8. To prevent accidental entanglement, attach high-visibility flags or similar markings along support cables.
9. Inspect SkyBrace assembly.
 - Assure all nuts and bolts are secure. Make sure they are properly torqued.
 - Ensure Support Cables are properly tensioned according to pre-tension instructions.
 - Inspect Tube Spans for damage. Check welds. Check for dents and cracks.

When the Two-Span SkyBrace has passed inspection, it is ready to be hoisted and installed.

Adjustable Base Connectors			
Base Threaded Connector		Base Slip Connector	
294 lbs.		507.78 lbs	
			

The Adjustable Base Threaded Connector can be adjusted with a large wrench. The Adjustable Base Slip Connector is adjusted with the SkyStretcher Mini.

Adjusting Unit for Base Slip Connector	
Refer to the SkyStretcher Mini Manual for operating Instructions.	Sky Stretcher Mini 

4.2 Fasteners, Connectors & Brackets

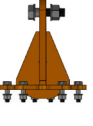
Fasteners

Refer to tables in Specifications, Section 2, for fastener types.

WARNING **PROPER FASTENERS!** Ensure proper fasteners are used in assembling SkyBraces.

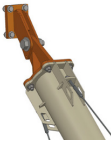
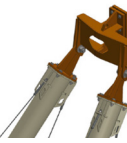
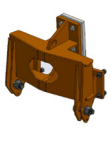
Connectors

Connectors attach to the top and bottom of a Tube Span. There is one Top Connector. The Base Connectors are adjustable to ensure leveling accuracy. There are two options for Base Connectors.

Top Connector	
158 lbs	
	

Structure Brackets

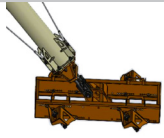
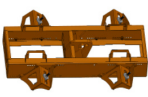
Structure Brackets attach SkyBraces to the structure being braced. There are two types of Structure Brackets, the Single-Brace Bracket, and the Dual-Brace Bracket.

Structure Brackets			
Single-Brace Bracket		Dual-Brace Bracket	
85 lbs		650 lbs	
			

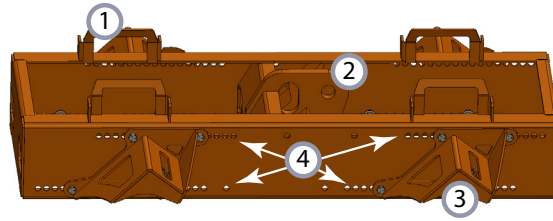
Anchor Brackets

Anchor Brackets anchor SkyBraces to the ground. There are three types of Anchor Brackets, the Footing Bracket, the Single Anchor Bracket, and the Multi-Anchor Bracket.



Anchor Brackets			
Footing Bracket 148 lbs		Single Anchor Bracket 135 lbs	
			
Multi-Anchor Bracket (SkyBase 100) 526.84 lbs			
			

Multi-Anchor Bracket Nomenclature



1. Lift Points (qty 4) - for telehandler lifting
2. Master Bolt Hole - Point of connection to SkyBrace
3. Anchor Brackets (qty 4) - For connecting to anchors
4. Adjustment Holes - For Anchor alignment

5. SkyBrace Installation

Installation Plan

This installation process is typical for bracing steel buildings. The bracing strategy may vary according to circumstance. If a bracing plan is provided, it must be followed.

5.1 Pre-Installation

1. **General Inspection:** Look for "Out of Service" tags. Verify that all parts are in place, all bolts are secure, and cables are tight. If any part of a SkyBrace has dents, cracks, or corrosion that diminishes strength, remove it from service.
2. **Tube Span(s):** Check for dents or cracks. Check for excessive corrosion (pitting).
3. **Fasteners:** Ensure all bolt assemblies (bolts, nuts, washers) are properly installed and torqued to spec. (See Fastener Specs Table)
4. **Brackets:** Check for cracks and excessive corrosion (pitting).

5. **Cables:** Visually inspect cables for kinks, fraying, or excessive wear. If damage exists, replace cable assembly before use.



Ensure rigging is rated for the weight of a SkyBrace before installation.

5.2 Installation

Bracing against Concrete

Footing Bracket Connection

1. Secure SkyBrace to the structure.
2. Secure Footing Bracket to concrete using concrete fasteners rated for the load or specified by a bracing plan.



Bracing Against Ground

Single and Multi-Anchor Bracket Connection

1. Secure SkyBrace to the structure.
2. Secure the appropriate Anchor Bracket to the ground using anchors specified by bracing engineer.

is achieved. It is important that the slip bolts are tightened before the Mini is removed. Slip Bolts must be torqued to 625 ftlb for a SkyBrace to achieve a 75 Kips rating.

Adjustable slip connector with SkyStretcher Mini and HPU 1.3

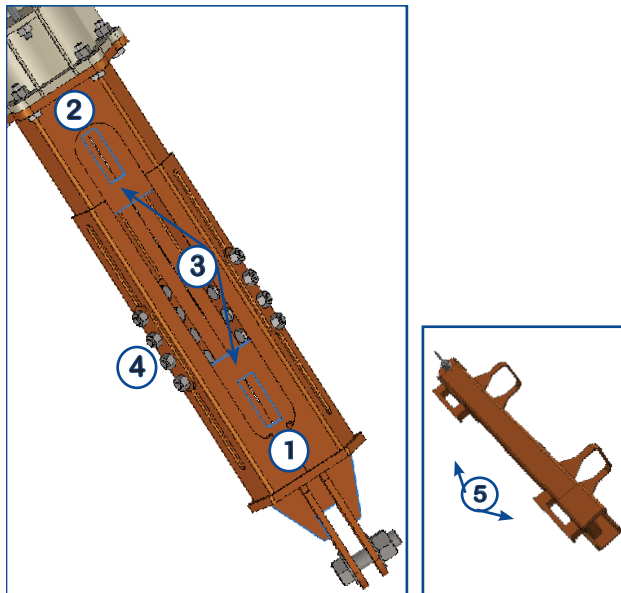
5.3 Adjusting the SkyBrace

Adjusting the length of a SkyBrace is made possible by the Base Connectors: the Adjustable Slip Connector and the Adjustable Threaded Connector.

Adjustable Slip Connector

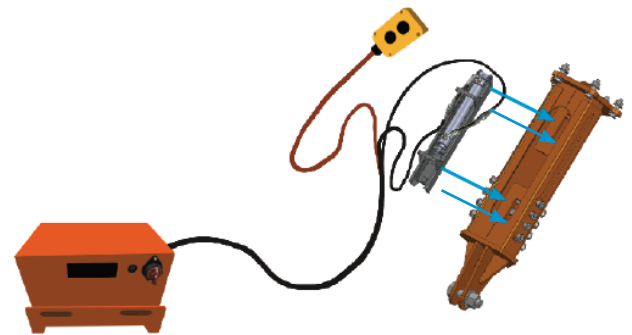
Adjustable Slip Connector Nomenclature

1. Outer Slider
2. Inner Slider
3. Key Slots
4. Slip Bolts
5. Keys (on SkyStretcher Mini)



The Slip Connector is adjusted with the SkyStretcher (Mini). The keys of the Mini must be fully inserted into the Key Slots of the Adjustable Slip Connector. Then all 16 slip bolts are loosened.

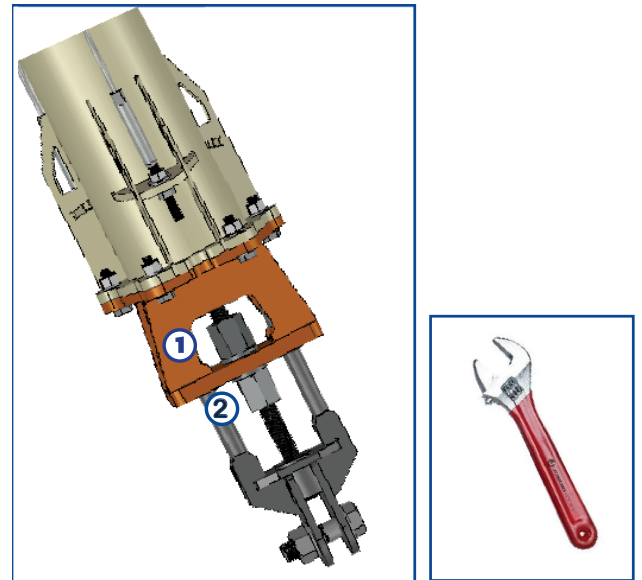
Using the HPU 1.3, the Mini is hydraulically driven to retract or extend until the desired length of a SkyBrace



Adjustable Threaded Connector

Adjustable Threaded Connector Nomenclature

1. Top Nut
2. Bottom Nut



The Threaded Connector is adjusted with a large wrench. This Connector has a top nut and a bottom nut. The opposing nut (the nut opposite the direction the Connector is intended to move) is used as a jam nut and must be tightened when adjustment is complete to allow for compressive (pushing) or tensile (pulling) loads.



5.4 Post-Installation Inspection

After installation, inspect each SkyBrace to ensure the Base Brackets are secure to the foundation or other anchor point. Ensure no part of the SkyBrace has been damaged during the installation process.

5.5 Take-Down and Disassembly

A bracing engineer must approve the removal of any given SkyBrace or group of SkyBraces.

Take-Down

1. Connect rigging to SkyBrace prior to removal
2. Disconnect SkyBrace from Structure and Anchor Brackets.
3. Hoist SkyBrace to the ground. Set it on bottom two struts

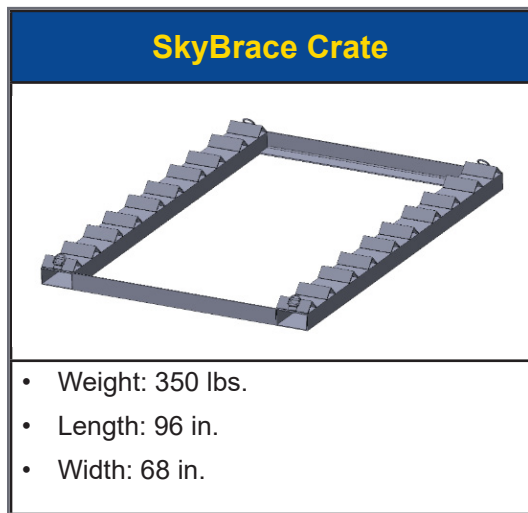
Disassembly

4. Disconnect struts and separate spans (If two span)
5. Fold Struts against TubeSpan and secure Support Cables.

6. Transport and Storage

6.1 SkyBrace Crate

The SkyBrace Crate is designed specifically to stow and transport SkyBraces safely and efficiently. SkyBraces transport as single Tube Spans stowed in the SkyBrace Crate.



Center SkyBrace sections as single TubeSpan lengths on the SkyBrace Crate. Ensure cables are not subject to entanglement, kinking, smashing, or other damage. TubeSpans sit in individual slots on a Crate and must be secured to the crate before stacking crates.

Stack Crates of SkyBraces no more than 5 sets high. Store on flat ground.

6.3 Preparing for Transport



WARNING

TRANSPORTING FASTENERS!

Ensure all fasteners are enclosed tightly in a covered compartment or tightened securely on the equipment before transporting.

6.2 Stow

When preparing the SkyBrace for stowing or transport, Secure Struts to TubeSpans. Secure cables to TubeSpans. Tighten all fasteners. (Loose fasteners can vibrate off during transportation.)



7. Inspections and Maintenance

Inspection is a visual or tactile check of a SkyBrace. Maintenance is torquing bolts, tensioning cables or adjusting a SkyBrace.

Thorough inspection prior to installation, as well as periodically after installation, is necessary to identify potential hazards or damage, and to initiate any needed replacement.

Inspection and maintenance should be done in accordance with the specifications and instructions provided in this manual.

CAUTION **IMPORTANT!** If the SkyBrace has structural damage, do not repair it. It should be taken out of service and tagged “Out of Service” when damaged or weakened from any cause. It must not be used until repairs are completed.

7.1 Periodic Inspection

Periodic inspections ensure the SkyBrace is functioning properly and that changes in weather and construction have not detrimentally affected the bracing. Periodic inspection should happen at least as follows:

- Every 72 hours
- After high wind (35 mph or more)
- After any impact that affects the bracing

Periodic Inspection Checklist

A. Structural Components of Bracing

1. Visually check weld joints on Tube Spans, Check Brackets for cracks or breaks or other signs of stress fatigue.
2. Visually check for bends or damage to tube spans, struts, and brackets.

B. Fasteners

1. Check for securement
2. Re-tension as necessary.
3. Check attachment to anchor

C. Wire Ropes

1. Check for fraying or other damage.
2. Ensure flagging is intact.

7.2 Annual Inspection and Repairs

Annually perform a thorough inspection of welds, fasteners, cables, and structural components to ensure they have not been damaged. If damage is evident or suspected, tag the equipment “Out of Service” through the MasterBolt location. Equipment that is tagged “Out of Service” shall not be used until repaired.

Replace damaged or missing parts with OEM components.

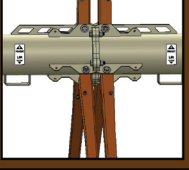
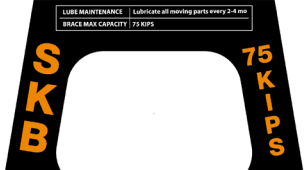
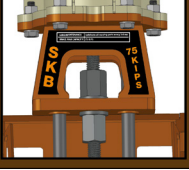
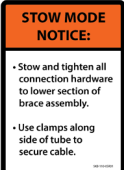
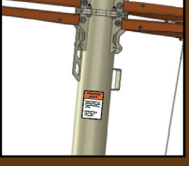
7.3 Modifications

Do not modify the SkyBrace.



Appendix A: Decals and Labels

The following chart will help to identify the decals and locations to ensure the equipment is properly marked.

Decal and Label Chart				
Decal ID#	Qty	Decal Purpose	Decal Visual	Decal Application
SKB-110-01R01	2	Name Decal		SKB-110-01R01 Application Location:  Qty per Machine: 2 Decal Durability: Standard
SKB-110-02R01	4	Hoist/Lift Decal		SKB-110-02R01 Application Location:  Qty per Machine: 4 Decal Durability: Standard
SKB-110-03R01	1	Base Connector Decal		SKB-110-03R01 Application Location:  Qty per Machine: 1 Decal Durability: Standard
SKB-110-04R01	1	SkyBase Name Decal		SKB-110-04R01 Application Location:  Qty per Machine: 1 Decal Durability: Standard
SKB-110-05R01	2	Stow Mode Notice		SKB-110-05R01 Application Location:  Qty per Machine: 2 Decal Durability: Standard





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