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**Make sure to read and fully understand this manual, and its specific notes and warnings, prior to assembly and erection of the structure.**

# **PROLYTE ST-TOWER MANUAL**

## **ASSEMBLY INSTRUCTIONS**

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### **1. SYSTEM DESCRIPTION**

The Prolyte Tower & Ground Support systems are lifting tools where the load is constrained in its horizontal movement by means of a Sleeve block, that is build around, and lifted along, the tower sections. The ST-Tower has a loading capacity that is limited by the lifting machinery: 2000 kg for an electric or hand operated chain hoist. In general towers and ground support systems are used where the lifting of loads from a building structure is impossible, very expensive, or when traditional telescopic winch stands do not have a sufficient in load capacity. ST-Towers use a vertical mast of standardized S40T truss as compression absorbing elements, these have much better strength and stability characteristics than traditional stands.

### **2. LIMITATIONS OF USE**

The ST tower system is to be used with Prolyte trusses only. Loads to the trusses and towers shall be vertical only, no side loading is allowed to the system.

The ST system is designed as temporary lifting structure for indoor use only. When used outdoors or when horizontal loading is applied appropriate measures, such as placing guy-wires (cable-stays) and ballast, have to be taken to ensure stability.

The ST system is to be built by competent and trained persons only. For all other applications contact your local dealer or Prolyte.

### **3. SCOPE OF USE**

Prolyte's ST-towers are designed for the lifting of truss spans over stages, dance floors, exhibition area's etc, where equipment such as lighting-, sound-, drapes or decoration elements is suspended. This can either be a single (stand-alone) Tower, a Goal post configuration (two towers with a single span) or in a rectangular set ups with 4, 6 tower ore more.

The spans of the trusses must NEVER exceed permissible length or load values given in the loading tables for the specific type of truss. ST-towers are to be built to a maximum height of 12 m. The total weight on the tower including, load, sleeve block and trusses must NEVER exceed 2000 kg when using a chain hoist<sup>1</sup>.

Prolyte-ST towers comply with the European Machine Directive and bear the CE-mark. ST-systems are designed for indoor use, for outdoor use please contact your local dealer or Prolyte.

### **WARNING**

Prolyte ST-towers are not designed to lift people!

## **4. IDENTIFICATION**

### **The ST-tower is composed of the following parts:**

1. Mast sections	S40T	12 kg/m	max. height 12 m
2. Base section	ST-004	36 kg	made of steel hollow sections with castors
3. Sort outriggers	ST-011	3 kg	short outriggers with screw jacks
Long outriggers	ST-012	13 kg	long outriggers with screw jacks
Stabilizer tube	T-51-PI094ST	1,5 kg	
4. Top section	ST-009	25 kg	Pulleys suited up to 8 mm chain links. Double pulleys optional.
5. Hinge set	CCS6-H	2 kg	4 hinges per tower needed
6. Electrical chain hoist	CH-SM10-1004	45 kg	WLL 1000 kg. Excluding chain.
Chain for hoist		1,6 kg/m	Chain 6.8 mm for hoist
7. Sleeve block	ST-010	44 kg	Suitable to fit all S-series truss.

### **Optional components:**

8. Tower erecting system	ST-HELP	27 kg	Lifting arm, which can lift the mast in an upright position with the help of the electrical hoist.
9. Safety set	ST-SAFE	27 kg	A one m. furnished mast section. Can safe load from ground level. Place ST-SAFE as close as possible to top-section

The embossed ring on the ends of the conical coupler receivers, and stickers featuring the Prolyte logo can clearly identify the MPT towers and truss.

### **NOTE**

Make sure the system is built only of genuine Prolyte components, which are clearly and positively identified as Prolyte products. Copies do exist, and even though they may appear to fit to Prolyte trusses, they do not have identical strength and safety characteristics.

## **5. DIMENSIONS & LOADING**

**The maximum allowable height** of the ST tower truss modules shall be no more than 12 m. To this ca. 0,65m is added for the base section with the outriggers (~ 0,3m), the hinge section (~ 0,1m) and the top section (~ 0,25m). Therefore the maximum height of a 12 m ST tower will be approximate. 12,65 / 12,75 m, depending on the amount of extension of the outriggers screw jacks.

**The maximum allowable load** to a ST-tower of 12 m is 2 ton (20 kN), this is set in relation to the maximum allowable height of the tower, and the absence of side loading or other kind of bending forces to the tower. **The surface area per ST tower base** will be approximate 1,2 x 1,2 m, using short outriggers (ST-011), and at least 2,1 x 2,1 m with the long outriggers (ST-012).

<sup>1</sup> In systems composed of two (2) towers or more, all lifting the same truss or grid, it is mandatory in Dutch Law to reduce the lifted load to 75% of the rated capacity, thus max. 750 kg per tower with 1 ton chain-hoist or 1500 kg with 2 ton hoist or double reefed 1 ton hoist.

### **WARNING**

Payloads are to be vertical only at all times. Side loads are NOT permitted.

## **6. GENERAL INFORMATION**

### **NOTE**

Make sure only one competent person is chosen to be responsible for and in charge of all coordinating actions and supervising the entire building, erecting and dismantling process.

### **WARNING**

Even if local legislation might be lacking any demands on personal safety, it is strongly advised to use fall protection-equipment when climbing the system during building, particularly at over 2m high from ground level, when falling hazards are prominent.

- 1) First identify all separate components and types of **Prolyte** truss to be used, ensure that you are fully conversant with this manual before you start using any of these parts, components and trusses!
- 2) The ST-tower, when built fully by hand, is a system that requires at least 6 persons for a 9 m tower and 9 persons for a 12 m tower. As some components or actions are relatively heavy it is strongly advised to work in team of two or three, that are well coordinated.
- 3) Never use trusses parts or vital components such as wire ropes (or chains), that show visual damage, deformation wear or have any other reason to doubt the safe functioning within the system. Make sure to check each item before each time of use.
- 4) Make sure that the system is built on solid ground. In situations where it has to be built on grass, sand or any unstable subsoil, under fill the screw jacks with plywood pads of 300x300x20mm (minimum size for each screw jack), and preferably a larger one (1200 x1200x20mm) under these, thus combining all the inner BASE screw jacks.

### **NOTE**

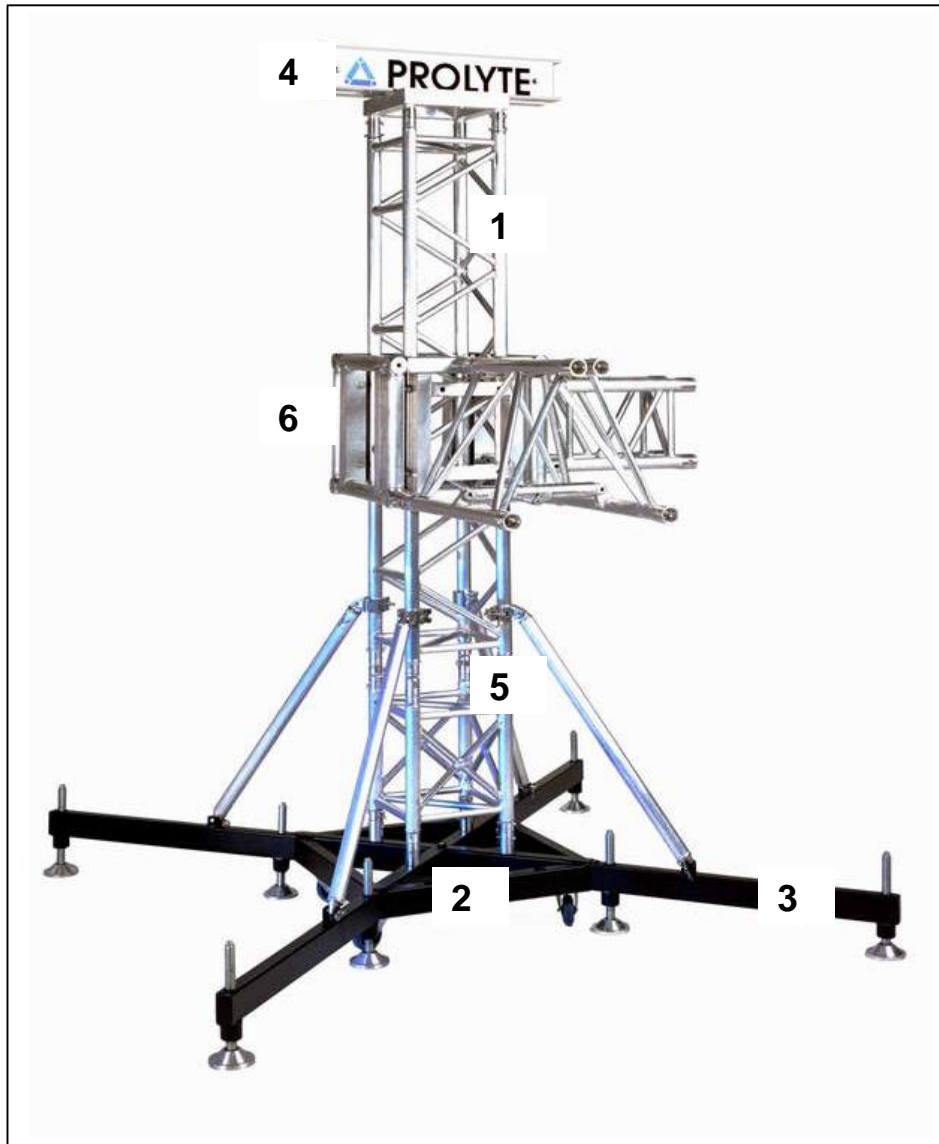
The ground pressure on the screw jacks underneath a tower can easily be more than 10 ton with dead load, live load, wind load and full ballast imposed!  
Never erect the tower when any doubt remains on the safety of the underlying ground.

- 5) Check the building site for obvious hazardous objects such as power lines. Keep a safe distance of at least 25m from those in any possible direction of sway in the wind, or the distance as specified in the national or local codes or regulations for safe operation of mobile cranes. Always check the planned tower-building activity with the power-company.
- 6) Check the building site for obstacles such as lamp-posts, trees or tree-tops, overhead piping, in house constructions, or any other higher objects that might hamper erection of the towers or might endanger it when swaying in the wind or so.
- 7) Check local authorities for possible risks in subsoil, such as low stability peat or bog fillings, sewer or large drainage pipes, waterlogged soils in slopes etc.
- 8) Measure the area where the tower needs to be and make sure there is enough room for all components including the outriggers with the plywood padding (the free and cleared building site for each tower, needs to be app. 3m wide, 13m deep and 14m high).<sup>2</sup>

<sup>2</sup> Except in the situations of hazardous objects or obstacles as mentioned above.

## 7. ASSEMBLY INSTRUCTIONS

### Assembly of a lifting-system with 4 towers (Ground support)



1. Mast section (S40T truss)
2. Base section
3. Long outrigger
4. Top section
5. Hinges
6. Sleeve block

Inspect all components before using them on visual wear & tear, deformation, damage or any other shortcomings. NEVER use parts or component that are not visually correct or you suspect have been subject to other damage.

**1**

The base section is equipped with 4 castors and 4 half conical couplers (CCS6-602) for the attachment of the mast section.  
The base can be used with either short or long outriggers.  
Put the base sections in the desired positions and place the first mast sections on top.

**2**



To secure the outriggers within the base, a trigger pin is placed on the inside of the base frame. Pull the pin outwards when mounting the outriggers.

**3**

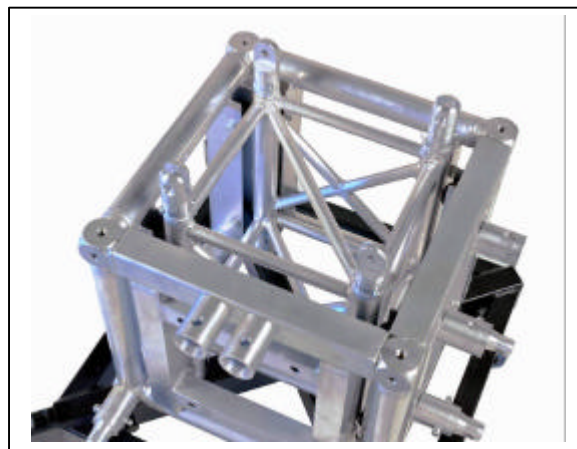


Mount the CCS7-751 female connectors onto the holes corresponding with the truss you want to use as span by using M16x35 mm bolts with spring washers.

**4**

Place the sleeve block over this first mast section. Disassemble the hinge-set; mount the half hinges to both the mast sections. Make and female connections should be mounted diagonally (see picture), in order to facilitate the erection of the mast.  
Make sure that the bracing and ladder side of the truss is corresponding with the tower mast to be connected.

**5**



A complete mounted hinge set. First locate the truss pins to one side, the truss now works as a hinge and can be erected easily. Then locate the remaining truss pins in the other side to fix the mast into position.

**6**



Connect the chosen truss type and spans to the sleeve blocks.

**7**

Built the mast to the desired length, however never exceeding 12 m in height.

**8**

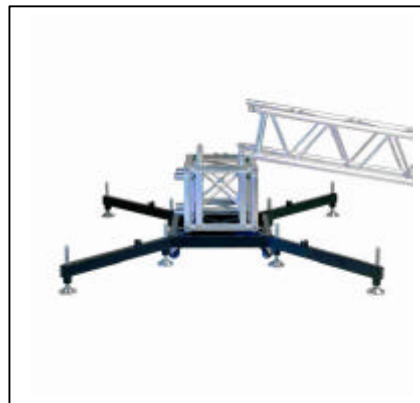
Put the top section with the pulleys to the end of the tower, and place the mast against the hinges. Make sure that the top section is correctly aligned with mast and sleeve block.

**9**

Unscrew the screw jacks in the outriggers; make sure that the castors of the base are free of any load. The complete load of the base should be supported by the screw jacks. Level the base by adjusting the screw jacks. The base must be perfectly levelled before the mast is erected.

Check placement of the ladder step braces and orientation of the hinges. Connect one side of the hinges of both mast sections.

**10**



**Attach the hoist to the ST-041 or on top of a connected truss.**

Reeve the chain along the mast and over the top section, in such way that no twists in the chain are to be found.

Connect the chain hook with a round sling to the lower part of the tower. Avoid unwanted slipping or running of the chain.

**11**



If a ST-HELP system is used read the manual before proceeding!

Lift the tower, walking towards the hinges. In opposite direction the tower should be pulled upwards with the help of a rope. The weight of the mast section (12 m) to be lifted is about. kg, half of which is initially resting on the hinges. If the tower is fully erected the remaining hinges can be connected.

Check the tower position being fully vertical. Correct to straight vertical position with the aid of a plumb-bubble by adjusting the screw jacks in the outriggers. Remove the rope from the tower (avoid climbing if not needed).

**12**



Connect the chain and the chain hoist in the desired position to the sleeve block and/or base section. Check proper direction of travel of the chain hoist (up = up). Run the chain hoist up until the chain is tight and the sleeve block is lifted a few centimeters. Check the chain being completely without twists all along its path.

**13**

Correct twisted chains by spinning the hoist around. If this is not sufficient, climb the tower and rotate the chain around in between the chain pulleys until all twists are out. The weight should be kept of the chain during the procedure. Check all chains being equally tensioned.

**14**

## **NOTE**

Twisted chains will drastically increase the wear of and do damage to the chain wheels on the top section and will cause risk of jamming in the chain hoist chain guides. Damaged chains are dangerous and shall not be used at any time.

Check all horizontal trusses on proper connection of the truss pins and bring the system to working height. Make sure to have sufficient stops to check whether the trusses and sleeve-blocks are still level. When the long outriggers are used, place the stabilizers between outriggers and tower chords. Load the trusses or tower's sleeve block with the planned load of equipment, cables etc and check the amount of deflection of truss prior to lifting the system. The load must be well distributed on the lower chords of the spans, resulting in axial loading of the tower only. Asymmetric loads or serious deflection causes bending forces in the towers and will reduce the lifting capacity.

**15**

## NOTE

The spans of trusses to be checked for loading data are about 0,5 m larger than the planned span because of the extension from 2 x 0,5 width of the sleeve blocks.

Before the loaded system is raised check the vertical position of the towers and proper surface contact of the screw jack dishes.

Run the system up to trim height, and secure it in this position by means of a secondary independent support such as a clutch chain or wire rope or the ST-SAFE system.

Check if all the towers are in an exact vertical position, using a level with a plumb-position-eye. Correct any angles in tightening or releasing the screw jacks of the base outriggers.

**16**

Connect all the towers to earth, if there is any danger expecting electrical installations that might short-circuit. Make sure a qualified person, knowing the local (soil-) conditions and legal regulations makes proper earth connections.

**17**

## WARNING

Electrical hoists that malfunction within the system, caused by short circuit or moist weather conditions, will prevent the ground support from being brought down when necessary.

Always make sure that the floor or subsoil is sufficiently capable of carrying the load of the system + towers as it is transferred through the screw jack dishes. Use plywood panels or similar material to increase bearing capacity if needed. If doubting check with a competent person.

**18**

The complete set of base section, lower mast section, sleeve block, hinge set and top section can be assembled as one compact set to facilitate loading, building and warehousing.

Size: 80 x 80 x 120 cm, weight +/- 120 kg.

**19**



## 8. Additional assembly requirements for a stand alone tower

1. Always use four (4) long outriggers (ST-012).
2. Attach a span of at least 12 meters of S-series truss at one side of the sleeve block.
3. Lay the mast on top of this span before erecting. The horizontal span prevents the mast from falling over during erection.
4. Never exceed 8 meters of height, due to stability requirements. For outdoor applications ballast and/or guy wires might be needed. Contact your local dealer or Prolyte.
5. The loading must be equally divided on the cantilever truss at either side of the sleeve block. The table below shows the maximum point load at the end of the cantilever.

Type of truss		length of cantilever				
		L = 50 cm	L =100 cm	L =150 cm	L =200 cm	L =250
S36R / S36V	Distributed load	1595 kg	1215 kg	979 kg	818 kg	700 kg
S36R / S36V	Point load at end	2000 kg	1586 kg	911 kg	598 kg	425 kg
S52V / S52SV	Distributed load	1796 kg	1466 kg	1235 kg	1065 kg	934 kg
S52V / S52SV	Point load at end	2000 kg	1783 kg	1063 kg	720 kg	523 kg
S66R / S66V	Distributed load	1892 kg	1599 kg	1383 kg	1216 kg	1083kg
S66R / S66V	Point load at end	2000 kg	1879 kg	1143 kg	787 kg	580 kg

Type of truss		length of cantilever			
		L = 60 cm	L =120 cm	L =160 cm	L =240 cm
S52F	Distributed load	1027 kg	897 kg	835 kg	712 kg
S52F	Point load at end	1990 kg	847 kg	687 kg	367 kg
S100F	Distributed load	1097 kg	1014 kg	967 kg	875 kg
S100F	Point load at end	2000 kg	905 kg	741 kg	413 kg

## 9. Additional assembly requirements for a Goal post set up

A goal post is a set up of two towers with an interconnecting truss span.

1. Always use four long outriggers (ST-012) per tower.
2. Attach a span between the two sleeve blocks.
3. Place each mast on top of this span before erecting. The horizontal span prevents the tower from falling over during erection.
4. Never exceed 8 meters of height, due to stability requirements. For outdoor applications ballast and/or guy wires might be needed. Contact your local dealer or Prolyte.
5. The loading must be equally divided on the cantilever truss at either side of the sleeve block. The table above shows the maximum point load at the end of the cantilever.

### **WARNING**

Do not use the towers or this system outdoors, without adequate safety and stability measures.

## 10. Additional requirements for outdoor use

Outdoor use of towers or ground support systems is always under risk of deterioration of weather conditions. Each of these influences (wind, rain, snow etc) or a combination of them can generate extra loading on the structure.

Wind generates a lot of extra vertical and/or horizontal force onto a structure even when it is a permeable frame like truss. Trusses are calculated as a 50% permeable surface.

Equipment like lighting fixtures is catching wind as well.

Appropriate measures have to be taken to prevent structures from falling/tipping over or being blown away.

For most outdoor applications an additional structural report is needed. Always anticipate all the actions needed.

**NOTE**

None of the Prolyte structures or components is calculated based on snow or ice loading. In case this might occur snow or ice has to be removed or the structure has to be dismantled.

1. Check the building site for any obstacles that might influence the structure or its building.
2. Make sure that the system is built on solid ground. In situations where it has to be built on grass, sand or any unstable subsoil, under fill the screw jacks with plywood pads of 300x300x20mm (minimum size for each screw jack), and preferably a larger one (1200 x1200x20mm) under these, thus combining all the inner base screw jacks.
3. Follow the assembly instructions from chapter 7.
4. Before lifting the structure to working height apply ballast first. Ballast/counterweights can be composed of various elements, depending on the national or local building codes and regulations, and the economic availability of materials. Check this with your local building inspection authorities and/or a local structural engineer.
  - Water tanks connected to the tower base
  - Interconnected stage floor structure, only if this is a completely rigid such as in a scaffolding frame. If connected by at least 4 scaffolding clamps to each lower mast section, the weight of the stage might be taken as part of the counterweight or ballast.
  - Lighting or sound equipment
  - Ground anchors
  - Concrete blocks
  - Canvas bags filled with sand or rubble
  - Steel bars
5. Ballast has to be attached directly to each base section. The best way to do this is to place the ballast on the long outriggers.

**WARNING**

Neglecting the addition of the appropriate amount of ballast and/or not applying part of the guy wires is dangerous. Under influence of wind this can result in failure of the complete structure.

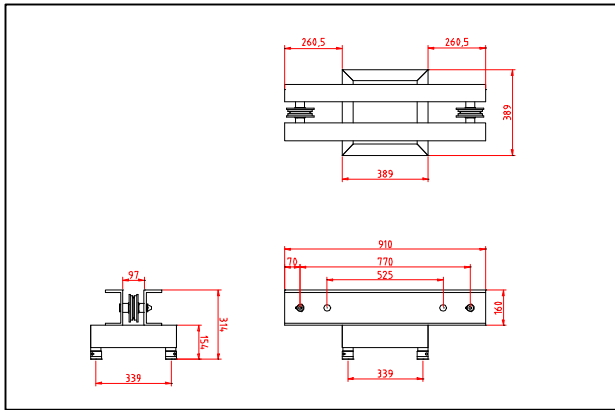
**11. Spare parts**

**Spare Parts:**

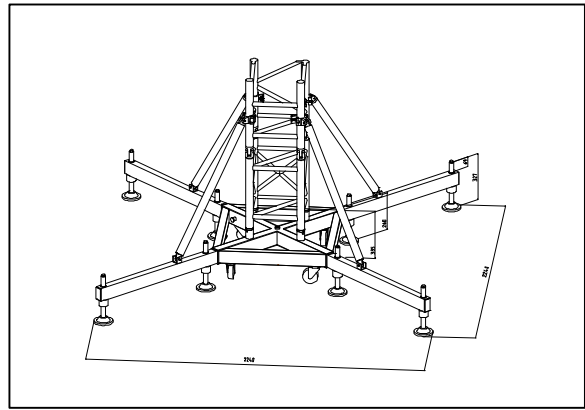
<b>Base-section ST-004</b>	SP-004-CAS	Blue, swivel castor
<b>Outriggers</b>	SP-SPIN-ST	Screw jack + dish
	ACC-LP-10	Locking pin
	CCS7-705	R-Spring for locking pin
<b>Hinge set 4 x CCS6-H</b>	CCS6-H-M-135	Male (pin) hinge part
	CCS6-H-FM-45	Female (fork) hinge part
	ACC-LP-16	Locking pin for hinge
	CCS7-705	Safety R spring

**WARNING:**  
**NOT FOLLOWING THE GUIDELINES IN THIS  
MANUAL MAY CAUSE DANGER, PROPERTY  
DAMAGE, INJURIES OR DEATH.**

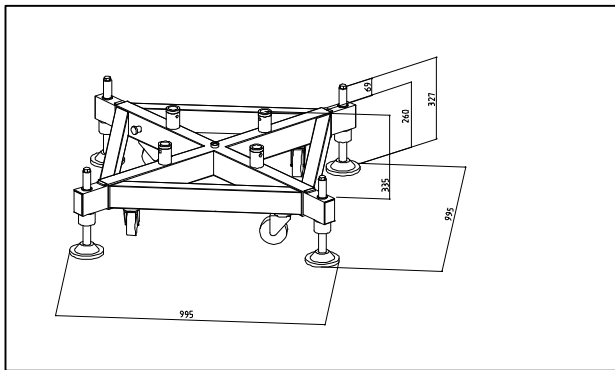
## 12. System Dimensions



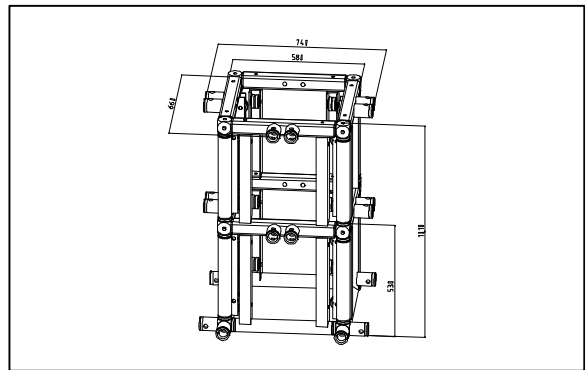
TOP SECTION ST-009



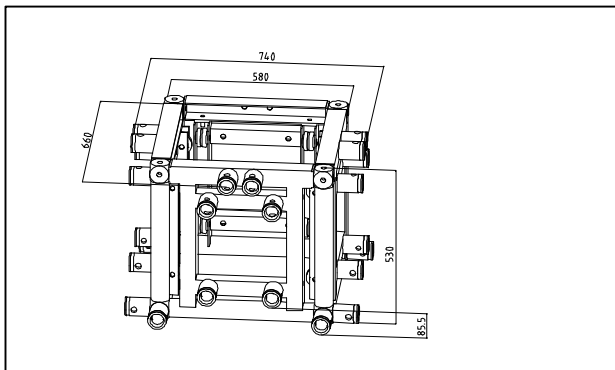
BASE SECTION ST-004 + ST-012



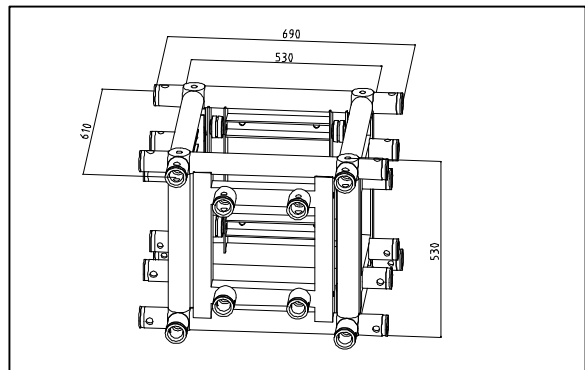
BASE SECTION ST-004 + ST-011



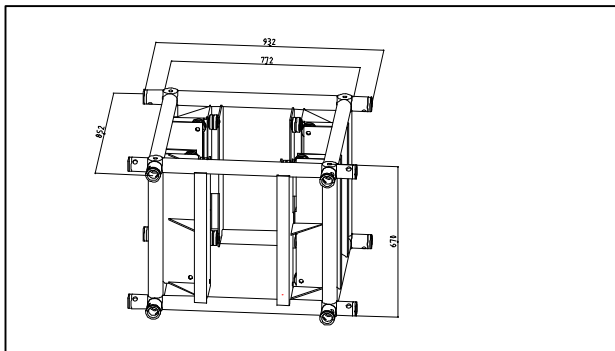
SLEEVEBLOCK ST-010 FOR S100F/S52F



SLEEVEBLOCK ST-010 FOR S52F/S36R



SLEEVEBLOCK ST-010 FOR S52V/S36R



SLEEVEBLOCK ST-010 FOR S66V/S36R