MATSING®

LENS TECHNOLOGY ENABLED

LSA Installation & Alignment General Guide

(Large Sphere Antenna - Date: 23 Oct 2024, Revision 2)

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LENS TECHNOLOGY ENABLED

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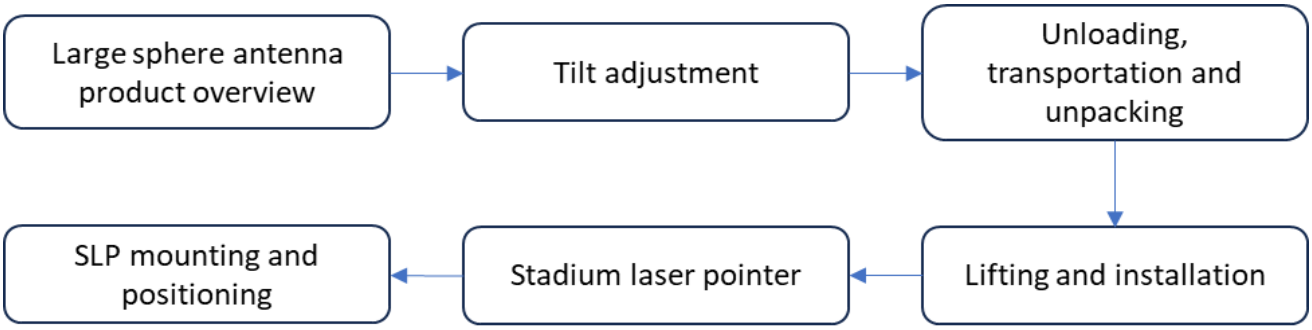
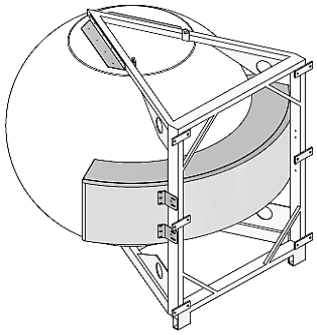


Revision History:

Date	*Description*	*Rev By*	*Check By*	*Rev no*
18-May-2024	*Initial Release*	*RL*	*Pavel*	*0*
11-Sep-2024	*Include LSA models and general update*	*RL*	*Pavel*	*1*
23-Oct-2024	*General update*	*RL*	*Pavel*	*2*

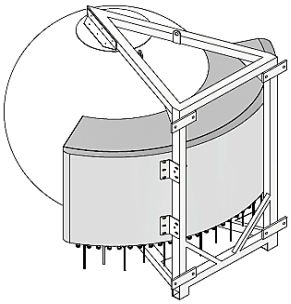
1.00 Large sphere antenna's (LSA) product overview

1.10 180cm lens antenna



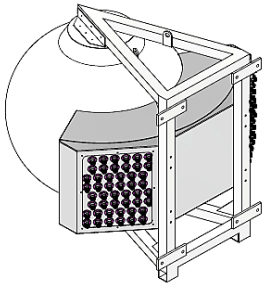
no.	Model	Dimensions (cm)			Weight	Connector	Angle tilting	AISG daisy chain group	
		Height	Width	Depth	(kg)	position		Group	Motors
1	MS-48H180	187.4	206.6	207.2	251.4	Bottom	Fixed		
2	MS-24H180	187.9	206.6	207.2	241.0	Bottom	Fixed		
3	MS-24C180-I	120.1	202.7	207.2	242.0	Bottom	RET/Manual	4	6
4	MS-24C180	120.1	202.7	207.2	235.2	Bottom	RET/Manual	4	
5	MS-12T180	187.4	213.7	202.2	233.1	Bottom	Fixed		
6	MS-12L180	187.4	213.7	202.2	233.1	Bottom	Fixed		
7	MS-12H180	187.4	204.7	207.2	233.1	Bottom	RET/Manual	2	6
8	MS-12.6DB180-T	187.4	204.7	207.2	240.7	Bottom	RET/Manual	1	6
9	MS-12.6DB180	187.4	204.7	207.2	240.7	Bottom	RET/Manual	1	6
10	MS-6T180	187.9	204.7	207.2	226.6	Bottom	RET/Manual	1	6
11	MS-6L180	187.9	204.7	207.2	226.6	Bottom	RET/Manual	1	6

1.20 120cm lens antenna



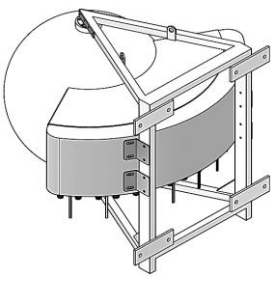
no.	Model	Dimensions (cm)			Weight	Connector	Angle tilting	AISG daisy chain group	
		Height	Width	Depth	(kg)	position		Group	Motors
1	MS-16H120	128.2	149.2	142.5	87.2	Bottom	Manual only		
2	MS-8T120	128.2	155.4	142.5	82.1	Bottom	RET/Manual	2	4
3	MS-8L120	128.2	155.4	142.5	82.1	Bottom	RET/Manual	2	4
4	MS-8H120	128.2	145.7	142.5	80.7	Bottom	RET/Manual	2	4
5	MS-8.4DB120-T	128.2	145.7	143.2	87.1	Bottom	RET/Manual	2	4
6	MS-8.4DB120	128.2	145.7	143.2	87.1	Bottom	RET/Manual	2	4

1.30 90cm lens antenna



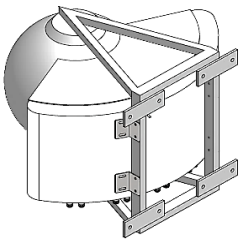
no.	Model	Dimensions			Weight	Connector	Angle tilting	AISG daisy chain group	
		Height	Width	Depth	(kg)	position		Group	Motors
1	MS-48F90	105.4	108.7	110.0	54.2	Left & Right	Fixed		
2	MS-48C90	105.4	108.7	110.0	54.2	Left & Right	Fixed		
3	MS-24F90	105.4	108.7	110.0	43.9	Left & Right	Fixed		
4	MS-24C90	105.4	108.7	110.0	43.9	Left & Right	Fixed		
5	MS-18H90	105.4	118.4	110.0	56.2	Bottom	Fixed		
6	MS-12H90	105.4	122.6	114.7	54.9	Bottom	Manual only		
7	MS-12F90	105.4	114.0	110.0	50.6	Bottom	RET/Manual	2	6
8	MS-12C90	105.4	114.0	110.0	50.6	Bottom	RET/Manual	2	6
9	MS-9SH90-FWB-S	105.4	114.0	110.0	49.9	Bottom	RET/Manual	2	6 and 3
10	MS-9H90-FWB2.3	105.4	114.0	110.0	52.0	Bottom	RET/Manual	2	6 and 3
11	MS-6H90	105.4	116.6	113.4	51.4	Bottom	RET/Manual	1	6
12	MS-6.3DB90-T	105.4	116.6	113.3	55.3	Bottom	RET/Manual	1	3
13	MS-6.3DB90	105.4	116.6	113.3	55.3	Bottom	RET/Manual	1	3

1.40 60cm lens antenna



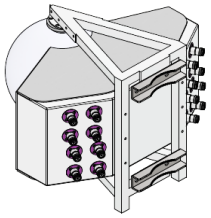
no.	Model	Dimensions			Weight	Connector	Angle tilting	AISG daisy chain group	
		Height	Width	Depth	(kg)	position		Group	Motors
1	MS-24F60	72.6	92.7	80.0	25.7	Bottom	Fixed		
2	MS-16F60	72.6	88.8	80.0	21.9	Bottom	Fixed		
3	MS-8H60	81.6	92.7	80.0	26.6	Bottom	Fixed		
4	MS-8F60	72.6	86.1	80.0	20.8	Bottom	RET/Manual	2	4
5	MS-8C60 (S)	72.6	86.1	80.0	24.8	Bottom	RET/Manual	2	4
6	MS-4H60	66.1	83.3	79.3	22.4	Bottom	RET/Manual	1	4
7	MS-4.2DB60-T	88.7	92.8	84.8	28.8	Bottom	RET/Manual	1	2
8	MS-4.2DB60	88.7	92.8	84.8	28.8	Bottom	RET/Manual	1	2

1.50 45cm lens antenna



no.	Model	Dimensions			Weight	Connector position	Angle tilting	AISG daisy chain group	
		Height	Width	Depth	(kg)			Group	Motors
1	MS-18F45	55.2	79.2	69.5	20.0	Bottom	Fixed		
2	MS-18C45	55.2	79.2	69.5	20.0	Bottom	Fixed		
3	MS-12F45	62.0	79.2	69.5	18.3	Bottom	Fixed		
4	MS-12C45	62.0	79.2	69.5	18.3	Bottom	Fixed		
5	MS-6F45	62.0	73.0	67.9	12.8	Bottom	RET/Manual	1	6
6	MS-6C45	62.0	73.0	67.9	12.8	Bottom	RET/Manual	1	6

1.60 30cm lens antenna



no.	Model	Dimensions			Weight	Connector position	Angle tilting	AISG daisy chain group	
		Height	Width	Depth	(kg)			Group	Motors
1	MS-8F30	40.6	52.2	48.4	10.6	Left & Right	Fixed		
2	MS-4F30	41.7	52.2	51.4	10.5	Bottom	RET/Manual	1	4

2.00 Antenna tilt adjustment

2.10 Fixed tilt products

2.11 Rear view of MS-48F90

2.12 Bottom-up view of MS-16F60

2.20 Manual tilt products

2.21 Rear view of MS-12H90

2.22 Bottom-up view of MS-16H120

2.30 Manual tilt adjustment

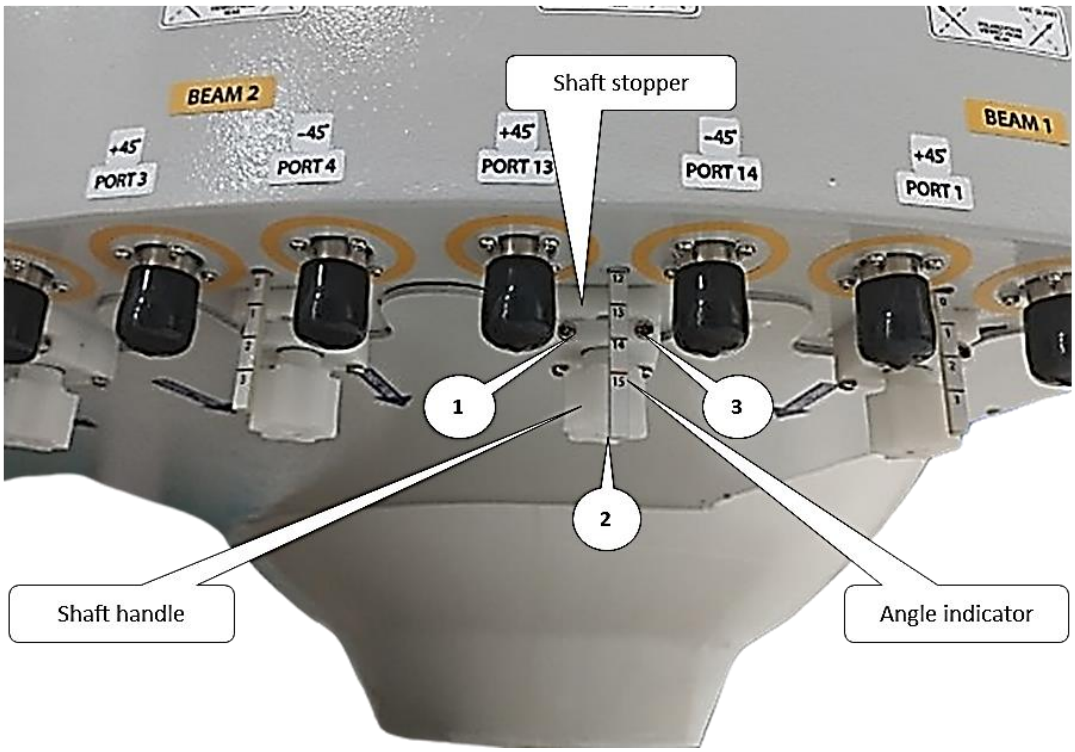
2.31 Tilt adjustment tools

"+" Screw driver 

Electric driver 

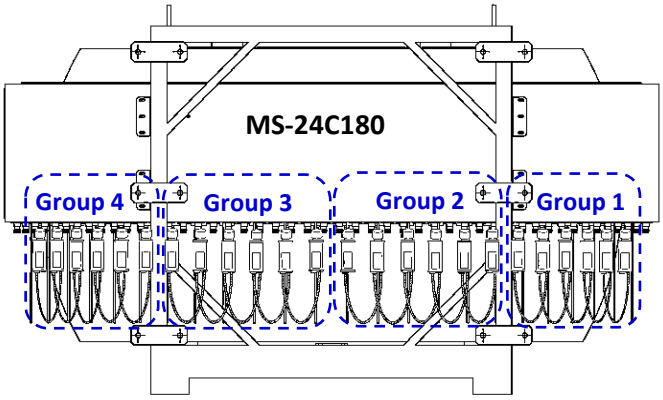
2.32 Tilt adjustment steps

Step 1: Tilt stopper loosening	***Step 2: Adjusting the Tilt***	***Step 3: Tilt Stopper Tightening***
Use a screwdriver to loosen the shaft stopper screws.	Adjustment by hand or use a screwdriver to turn the shaft handle.	Use a screwdriver to tighten back the shaft stopper screws.

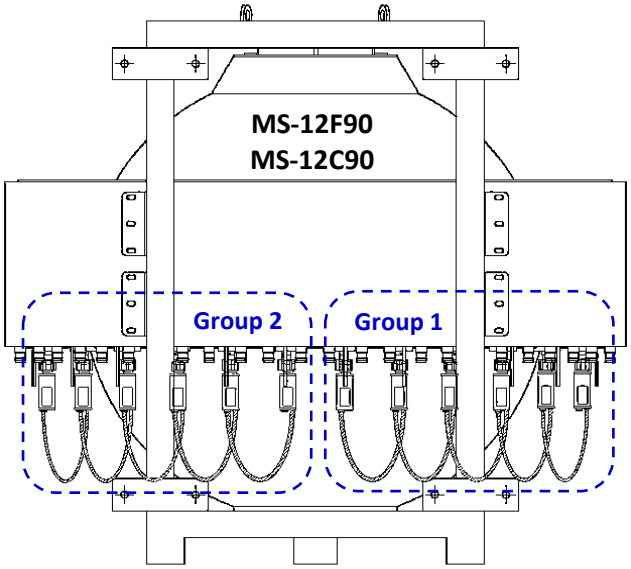


2.40 "S" RET motor tilt products

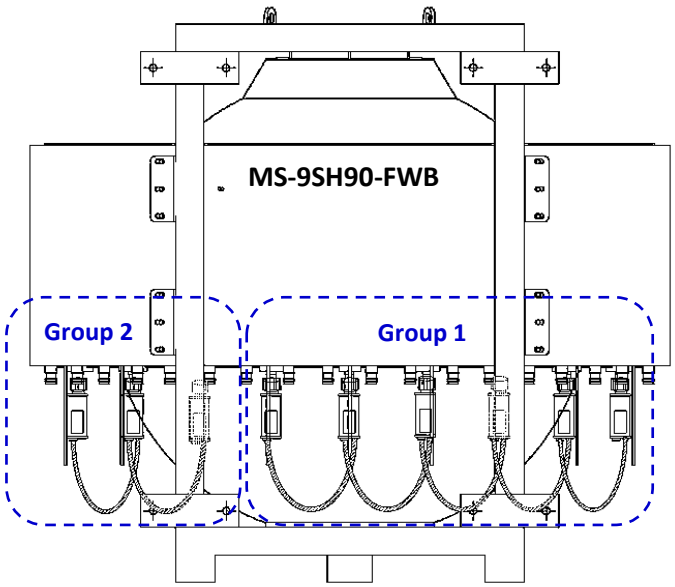
2.41 4 groups of 6 motors



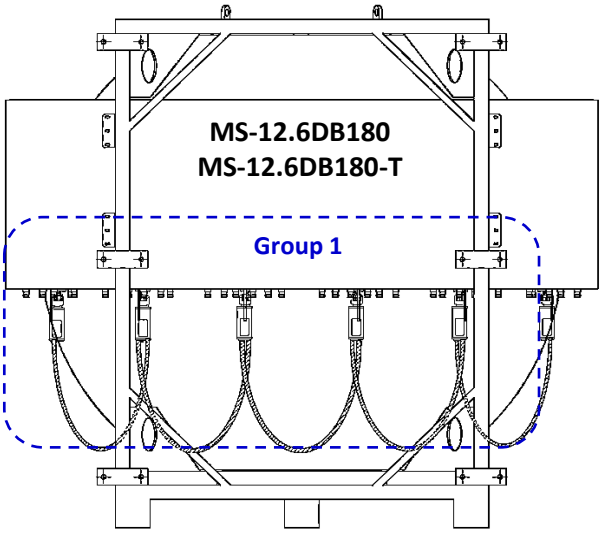
2.42 2 groups of 6 motors



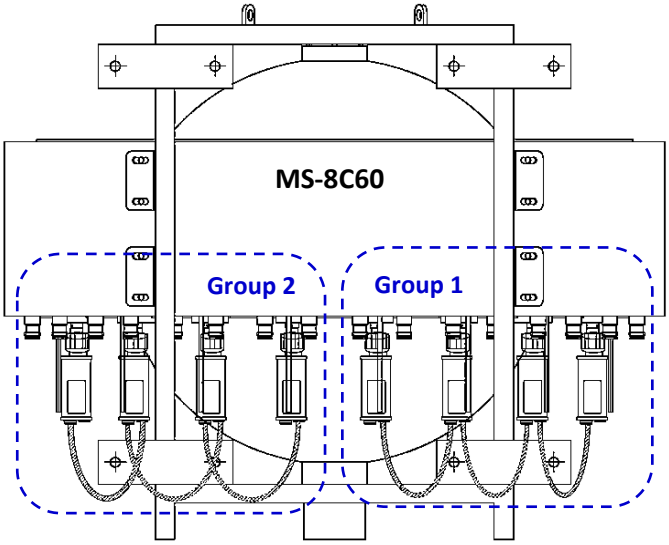
2.43 1 group of 6 motors + 1 group of 3 motors



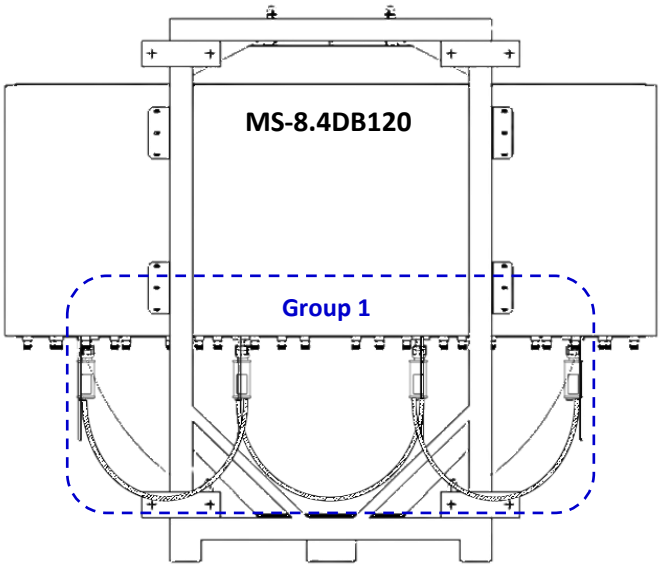
2.44 1 group of 6 motors



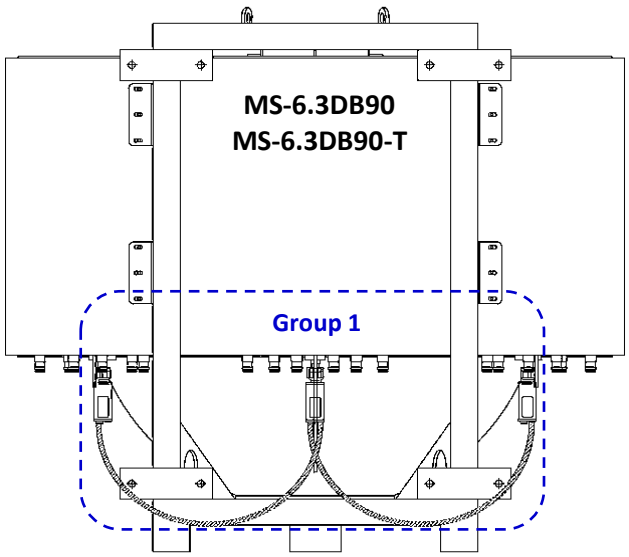
2.45 2 groups of 4 motors



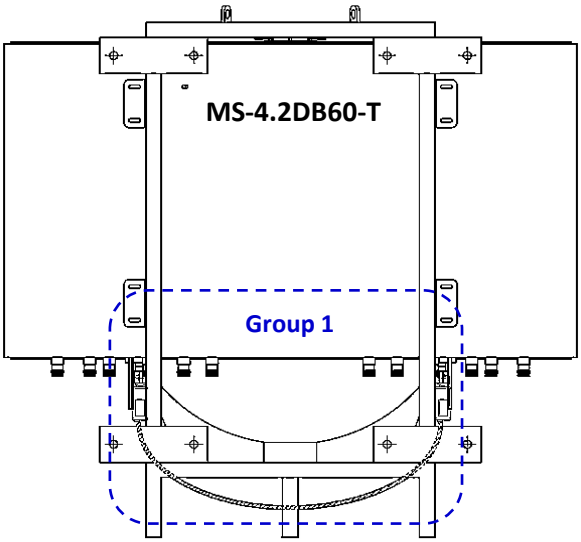
2.46 1 group of 4 motors



2.47 1 group of 3 motors



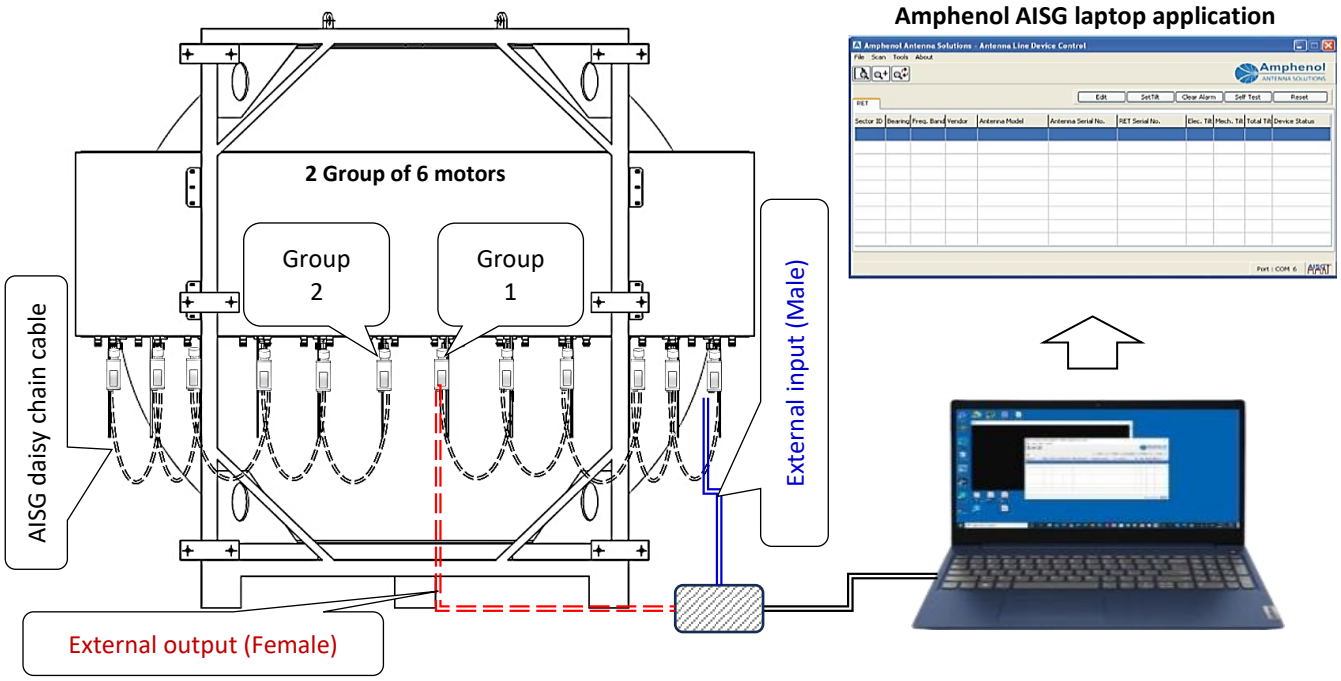
2.48 1 group of 2 motors



2.50 "S" RET motor tilt adjustment

2.51 Motor installation and connection

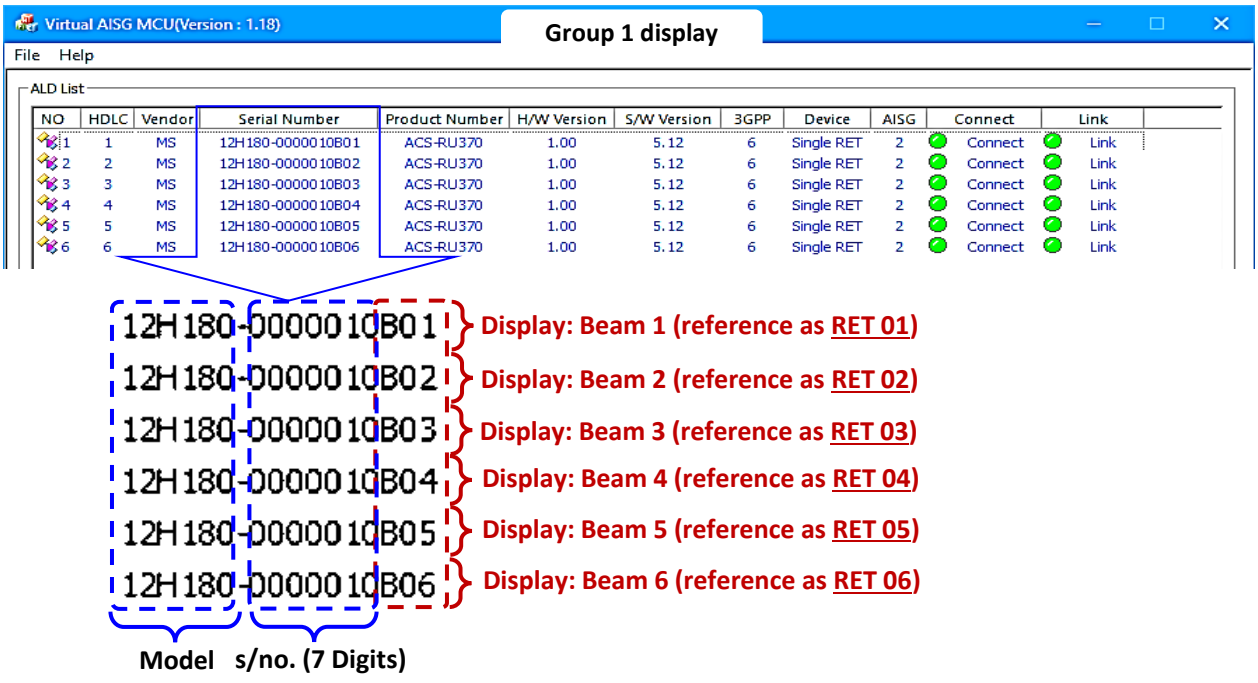
Example of: MS-12H180 son: #10



2.52 RET operations/information

A standard AISG 2.0-compliant cable (not included) is used to connect the MDCU to the AISG interface control. Once connected, use an AISG 2.0-compliant control software to perform a subunit SCAN to identify the RET elements.

2.53 Group 1 display information and reference

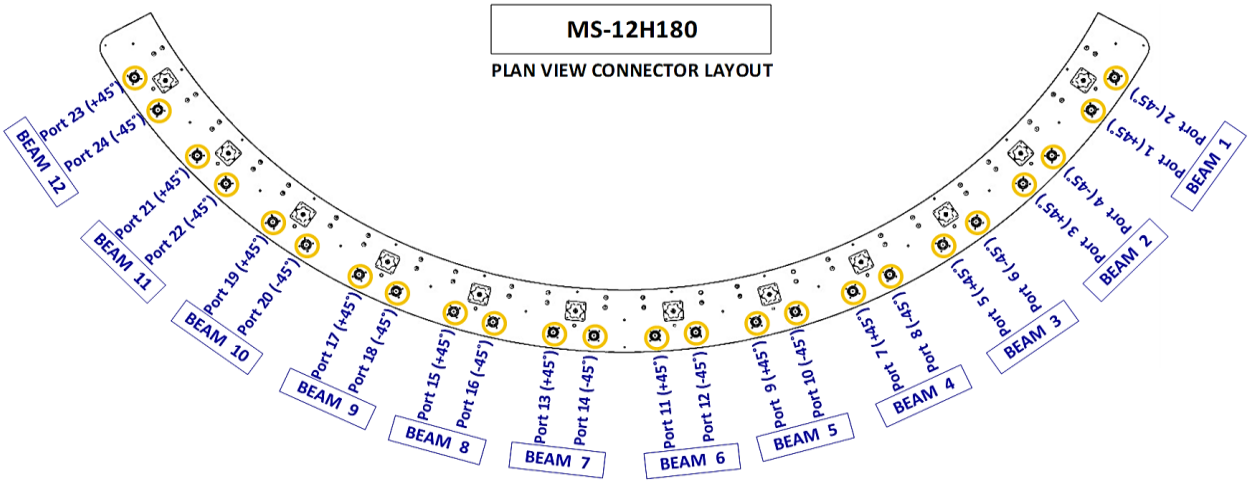


2.54 Model and serial numbers referenced from label

Reminder: If information has been edited, remember to perform "radio hard reset" for changes to take place.

Add 3 Zero(0) in front of the serial numbers.
If is shorter than 7 digits

2.55 Antenna plan view connector layout

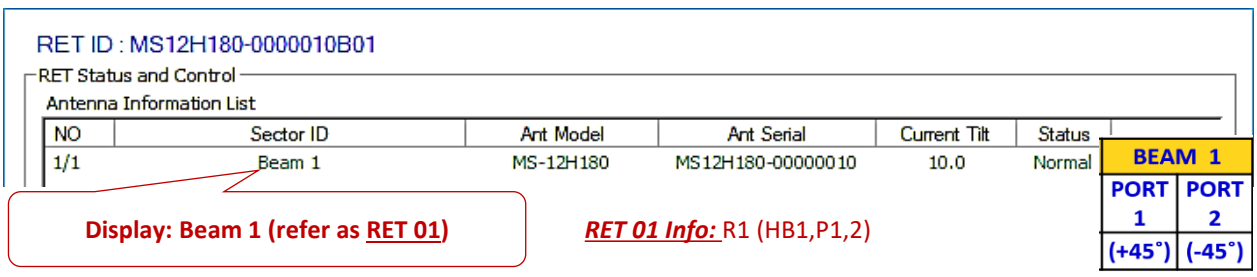


2.56 Antenna connector port table

BEAM 6		BEAM 5		BEAM 4		BEAM 3		BEAM 2		BEAM 1	
PORT 11	PORT 12	PORT 9	PORT 10	PORT 7	PORT 8	PORT 5	PORT 6	PORT 3	PORT 4	PORT 1	PORT 2
(+45°)	(-45°)	(+45°)	(-45°)	(+45°)	(-45°)	(+45°)	(-45°)	(+45°)	(-45°)	(+45°)	(-45°)

BEAM 12		BEAM 11		BEAM 10		BEAM 9		BEAM 8		BEAM 7	
PORT 23	PORT 24	PORT 21	PORT 22	PORT 19	PORT 20	PORT 17	PORT 18	PORT 15	PORT 16	PORT 13	PORT 14
(+45°)	(-45°)	(+45°)	(-45°)	(+45°)	(-45°)	(+45°)	(-45°)	(+45°)	(-45°)	(+45°)	(-45°)

2.57 Group 1 beam numbers and port numbers display



Display: Beam 1 (refer as RET 01)

RET 01 Info: R1 (HB1,P1,2)

Group 1 repeat beam 2 to beam 6 display as follows:

RET 02 Info: R2 (HB2,P3,4)

BEAM 2	
PORT 3	PORT 4
(+45°)	(-45°)

RET 03 Info: R3 (HB3,P5,6)

BEAM 3	
PORT 5	PORT 6
(+45°)	(-45°)

RET 04 Info: R4 (HB4,P7,8)

BEAM 4	
PORT 7	PORT 8
(+45°)	(-45°)

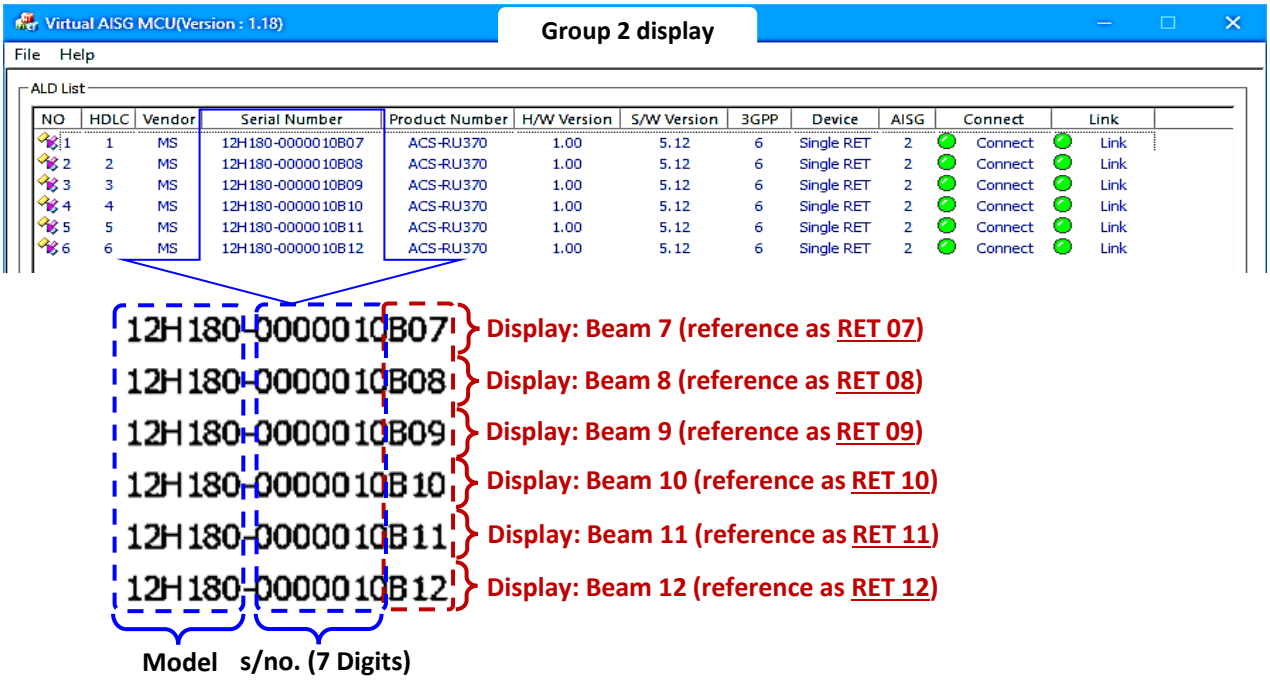
RET 05 Info: R5 (HB5,P9,10)

BEAM 5	
PORT 9	PORT 10
(+45°)	(-45°)

RET 06 Info: R6 (HB6,P11,12)

BEAM 6	
PORT 11	PORT 12
(+45°)	(-45°)

2.58 Group 2 display information and reference



Display: Beam 7 (reference as RET 07)

Display: Beam 8 (reference as RET 08)

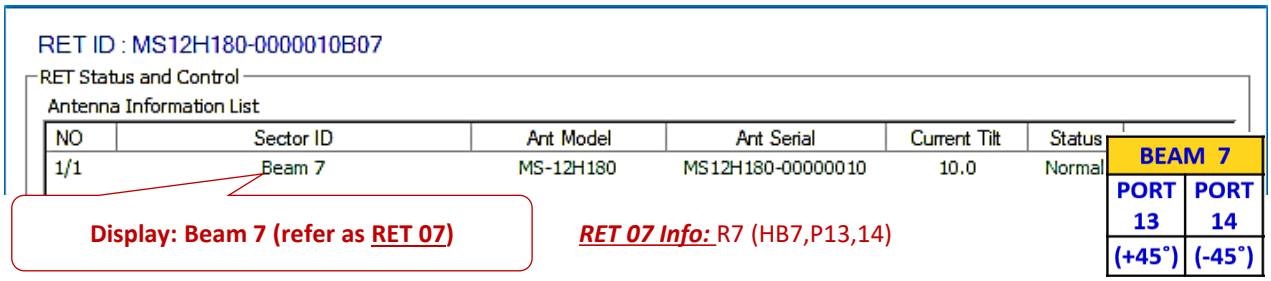
Display: Beam 9 (reference as RET 09)

Display: Beam 10 (reference as RET 10)

Display: Beam 11 (reference as RET 11)

Display: Beam 12 (reference as RET 12)

2.59 Group 2 beam numbers and port numbers display



Display: Beam 7 (refer as RET 07)

RET 07 Info: R7 (HB7,P13,14)

BEAM 7	
PORT 13	PORT 14
(+45°)	(-45°)

Group 2 repeat beam 7 to beam 12 display as follows:

RET 08 Info: R8 (HB8,P15,16)

BEAM 8	
PORT 15	PORT 16
(+45°)	(-45°)

RET 09 Info: R9 (HB9,P17,18)

BEAM 9	
PORT 17	PORT 18
(+45°)	(-45°)

RET 10 Info: R10 (HB10,P19,20)

BEAM 10	
PORT 19	PORT 20
(+45°)	(-45°)

RET 11 Info: R11 (HB11,P21,22)

BEAM 11	
PORT 21	PORT 22
(+45°)	(-45°)

RET 12 Info: R12 (HB12,P23,24)

BEAM 12	
PORT 23	PORT 24
(+45°)	(-45°)

3.00 Antenna unloading, transportation, and unpacking

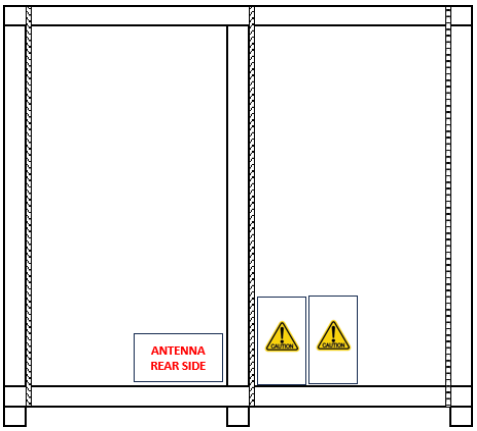
3.10 Safety precaution

DANGER	*Workplace safety and health compliance are required when performing the antenna loading, unloading, lifting, and transportation. Approprite personal protection equipment, material handling machinery, equipment's, and tool's should be used together with certified personnel.*

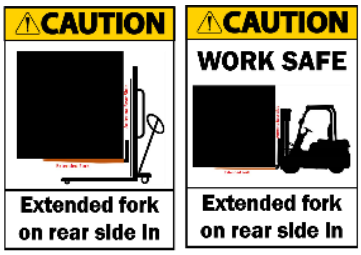
3.20 Antenna wooden crate lifting and handling caution point *(90 to 180cm lens)*

CAUTION	*1) To prevent unbalance during lifting and moving for the antenna's lens with 90 cm to 180 cm, lifting the fork can "only" entry from the antenna's "REAR SIDE." 2) "Extended fork "must" be used for lifting and moving, and the length shall not exceed 1.5 times the lifting fork.*

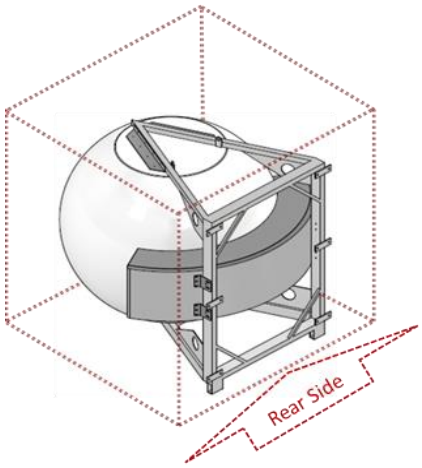
3.21 Unloading, transportation, and unpacking (example of MS-24H180)



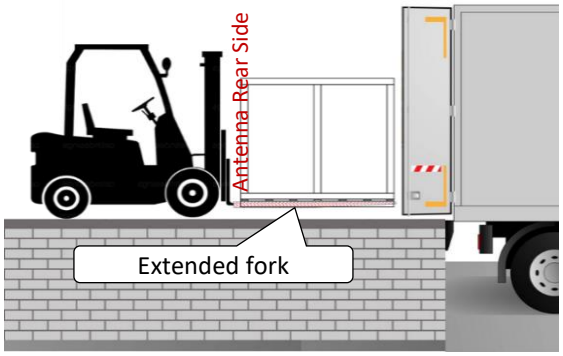
Antenna rear side label

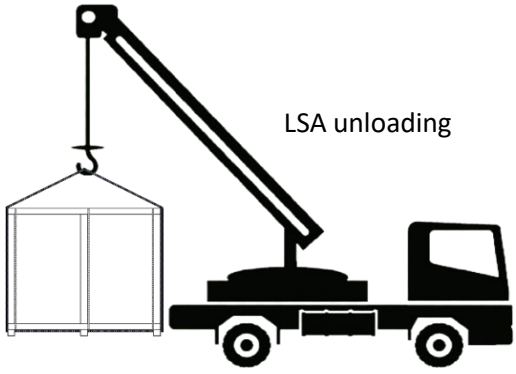


ANTENNA REAR SIDE

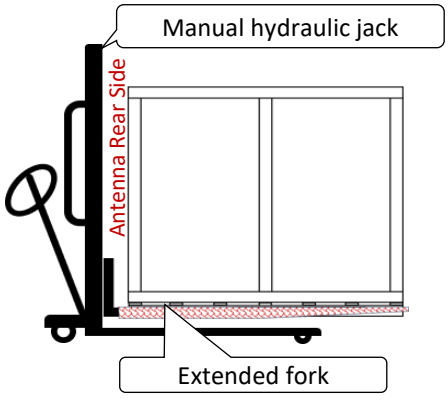


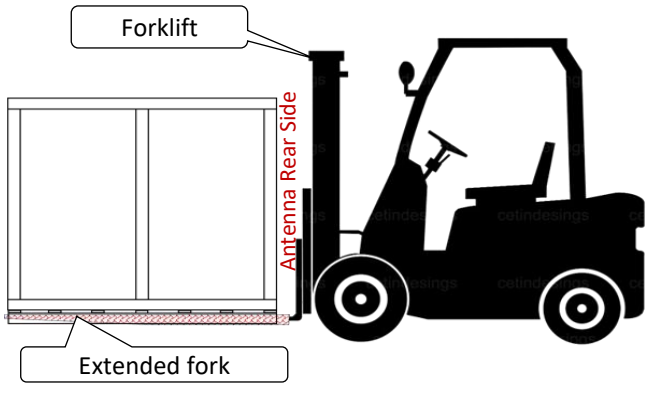
3.22 Unloading using a crane truck, manual hydraulic jack, or forklift





3.23 Point-to-point transport by manual hydraulic jack or forklift

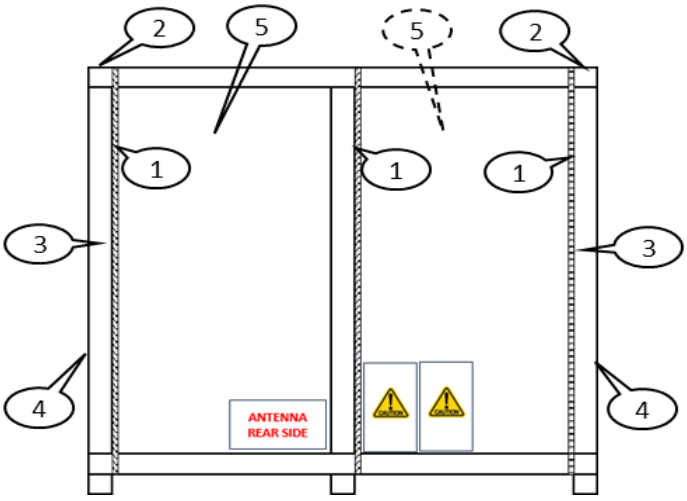


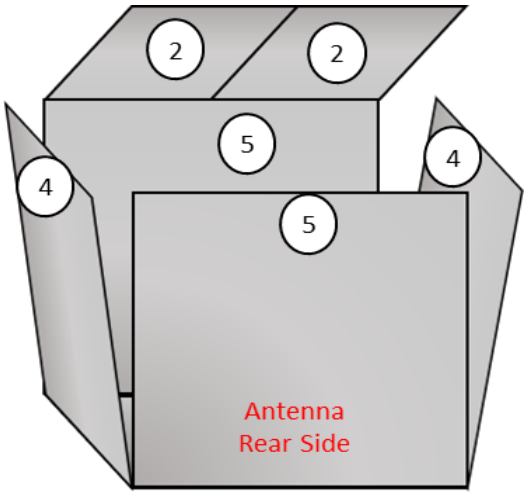


3.24 Wooden crate unpacking tools and steps (example of MS-24H180)

Unpacking tools

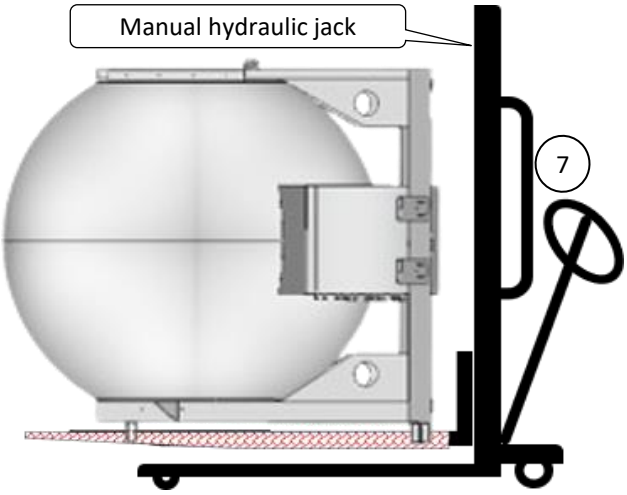
MS-24H180 Unpacking Step	
Step 1	Use a cutter to cut and remove plastic straps.
Step 2	Unscrew and remove the top panel.
Step 3	Unscrew the left and right sides to remove the rear panel.
Step 4	Remove left and right side panels.
Step 5	Remove front and rear panels.





Step 6	Unwrapping shrink wrap.

Step 7	Use a manual hydraulic jack with an extended fork for transporting.



4.00 Antenna lifting and installations

4.10 Equipment preparations

CAUTION	*Antenna installation location may vary from point to point in facing different terrains and environments; only appropriate material handling machines, lifting equipment, and working platforms are to be deployed with a certified operator.*

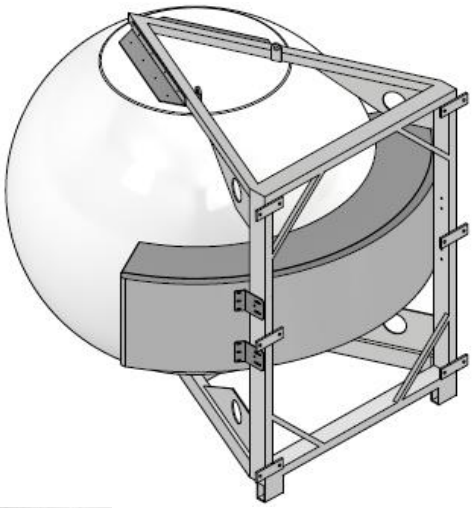
4.20 Planning and execution

CAUTION	*Advance planning for the antenna position and direction is essential to ensure minimum risk and safety compliance during lifting, installation and adjustment.*

4.30 Lifting and installation

4.31 Antenna frame bracket support

Lens Size	L x W (mm)	Thickness (mm)	Holes Size (mm)	Spacing (mm)	Qty
180	175 x 60	10	Ø15	130	6
120	175 x 60	10	Ø13	131	4
90	175 x 60	10	Ø13	132	5
60	175 x 60	8	Ø13	133	6
45	175 x 60	8	Ø13	134	7
30	Similar to MBA antenna standard size bracket				



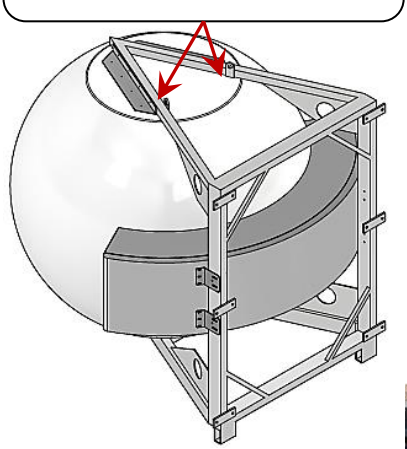
bracket and fitting

4.32 Additional supporting bracket (User custom-make)

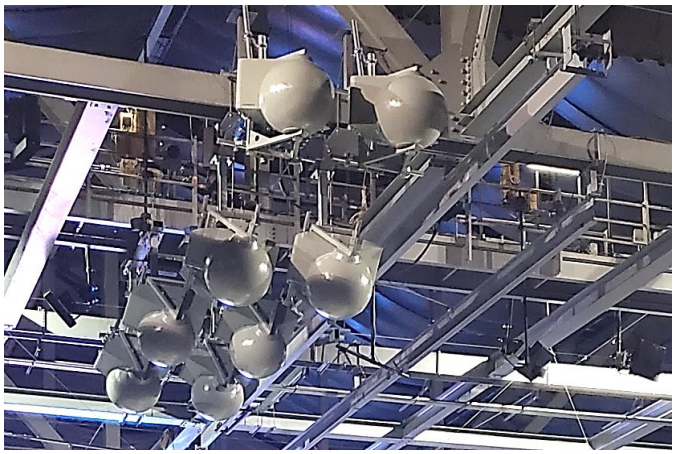
Important Notes: The user is required to custom-make the additional supporting bracket and tighten the existing antenna bracket to meet the deployment needs.

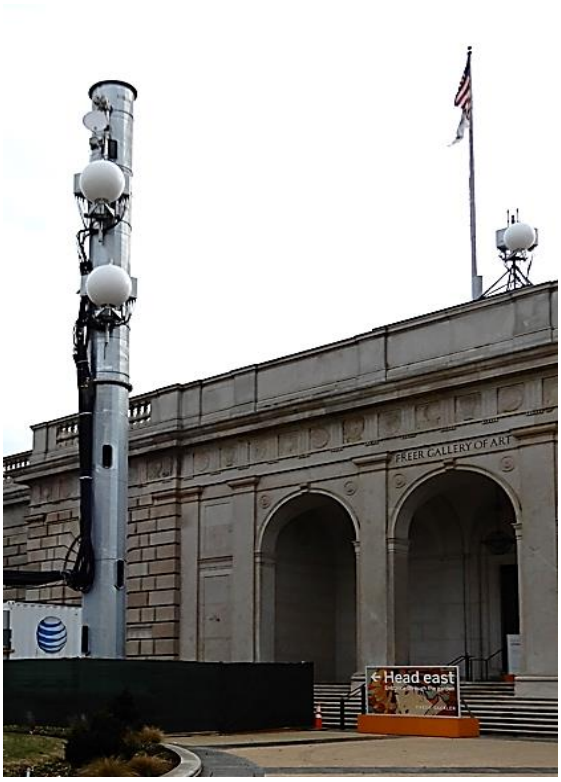
4.33 Lifting or hoisting up the antenna

Hook points located at the center of gravity



4.34 Antenna installation (on-site picture sample)





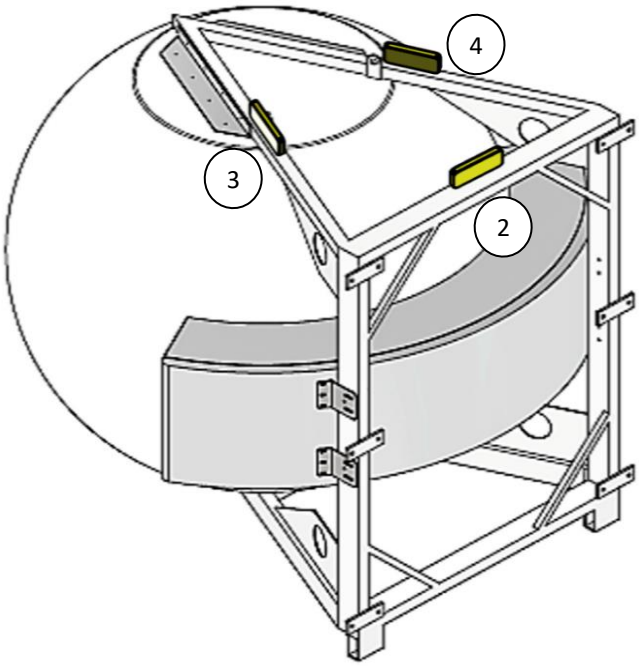
4.35 Antenna leveling and steps (for horizontal setting)

Step 1	Digital gauge calibration to zero "0" level

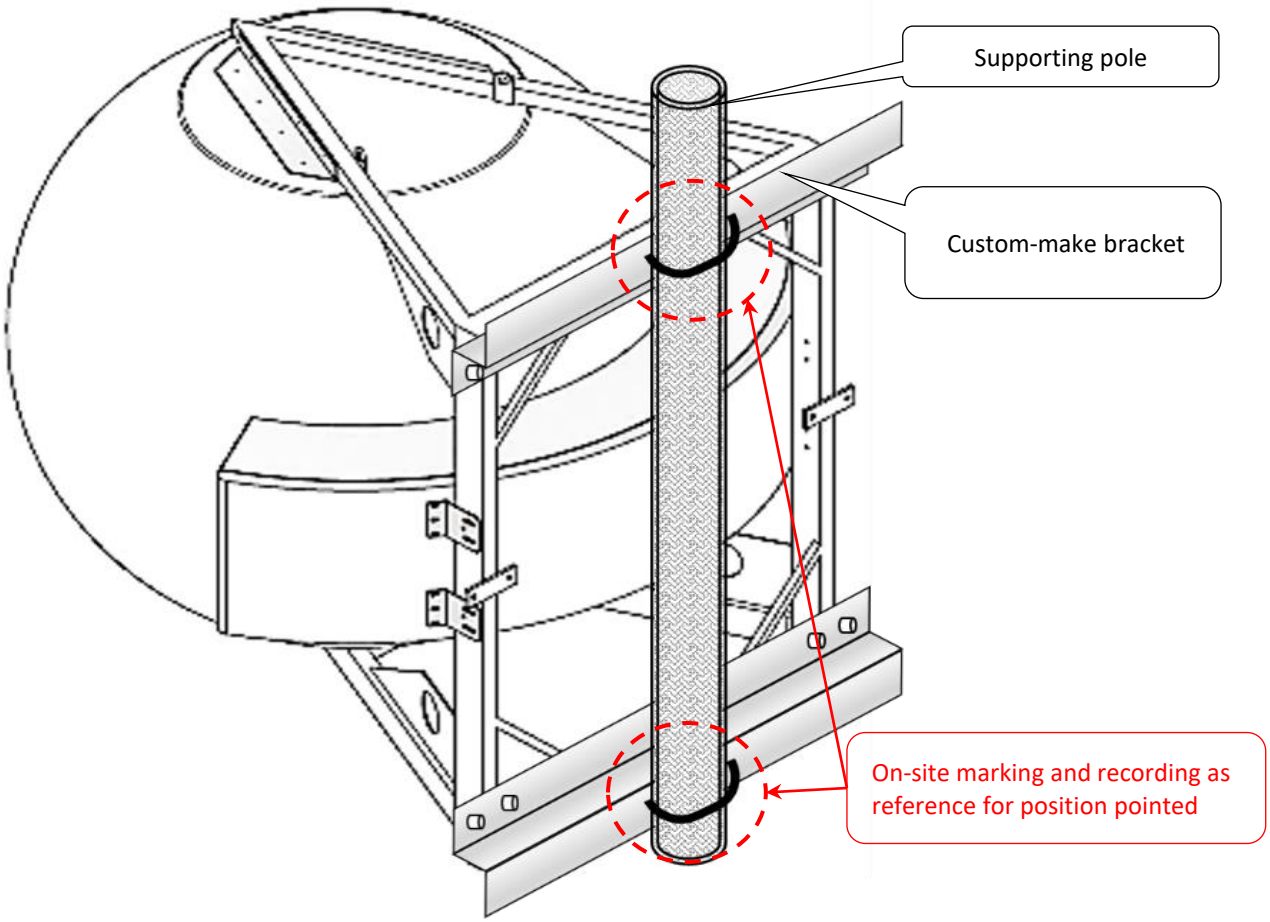
Step 5	Acceptable range (0˚ zero ≤0.2˚)

Step 6	If level is offset, tilt and adjust according to the level display.

Target level is 0˚ (zero) ≤0.2˚	
Step 2	Place the digital gauge on the rear frame top center.
Step 3	Place the digital gauge on the right frame top center.
Step 4	Place the digital gauge on the left frame top center.



4.36 Antenna leveled, secure, and marking



5.00 Antenna stadium laser pointer (SLP)

5.10 Types of stadium laser pointer

5.11 MS-LSA-SLP-1 (for 6 models)

1	MS-18H90	3	MS-8H60	5	MS-12H90
2	MS-18F45	4	MS-8F30	6	MS-12F45

5.12 MS-LSA-SLP-2 (for 16 models)

1	MS-18H90	5	MS-12H90	9	MS-8H120	13	MS-16H120
2	MS-18F45	6	MS-12F45	10	MS-8F60	14	MS-16F60
3	MS-8H60	7	MS-6H90	11	MS-48H180	15	MS-24H180
4	MS-8F30	8	MS-6F45	12	MS-48F90	16	MS-24F90

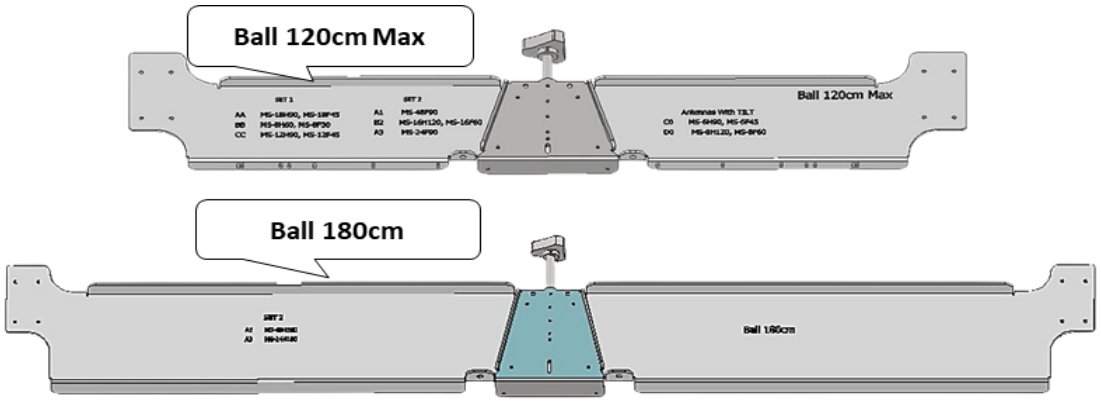
5.20 Example of MS-LSA-SLP-2 mounting guide

5.21 Model setting and assembly configuration table

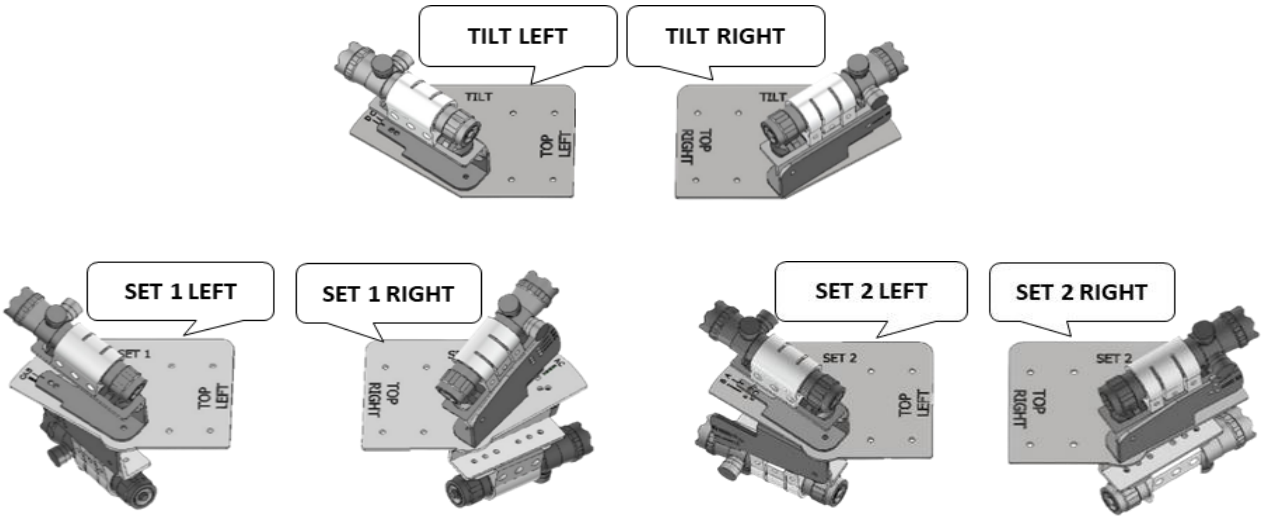
Setting	Model	Frame Width	Main Base Plate ID	Left & Right Base Plate ID	Left Angle Top	Right Angle Top	Nos of Rows	Tilt Up	Row nos	Tilt Down	Row nos
AA	MS-18H90	620.00 (24.41")	Ball 120cm Max	SET 1	45	55	3	-17	Row 1	17	Row 3
	MS-18F45	350.80 (13.81")			45	55	3	-17	Row 1	17	Row 3
BB	MS-8H60	466.82 (18.38")	Ball 120cm Max	SET 1	37.5	52.5	2	-13	Row 1	13	Row 2
	MS-8F30	220.00 (8.66")			37.5	52.5	2	-13	Row 1	13	Row 2
CC	MS-12H90	535.00 (21.06")	Ball 120cm Max	SET 1	45	55	2	-8.7	Row 1	8.7	Row 2
	MS-12F45	350.80 (13.81")			45	55	2	-8.7	Row 1	8.7	Row 2
A1	MS-48H180	1290.00 (50.79")	Ball 180cm	SET 2	57.5	52.5	4	-12.9	Row 1	12.9	Row 4
	MS-48F90	518.00 (20.39")	Ball 120cm Max		57.5	52.5	4	-12.9	Row 1	12.9	Row 4
B2	MS-16H120	720.00 (28.35")	Ball 120cm Max	SET 2	48.8	56.2	2	-6.5	Row 1	6.5	Row 2
	MS-16F60	466.80 (18.38")			48.8	56.3	2	-6.5	Row 1	6.5	Row 2
A3	MS-24H180	1290.00 (50.79")	Ball 180cm	SET 2	57.5	52.5	2	-4.3	Row 1	4.3	Row 2
	MS-24F90	518.00 (20.39")	Ball 120cm Max		57.5	52.5	2	-4.3	Row 1	4.3	Row 2
C0	MS-6H90	612.00 (24.09")	Ball 120cm Max	TILT	50	50	1				
	MS-6F45	350.80 (13.81")			50	50	1				
D0	MS-8H120	720.00 (28.35")	Ball 120cm Max	TILT	52.5	52.5	1				
	MS-8F60	466.80 (18.38")			52.5	52.5	1				

5.30 SLP parts description and configuration overview

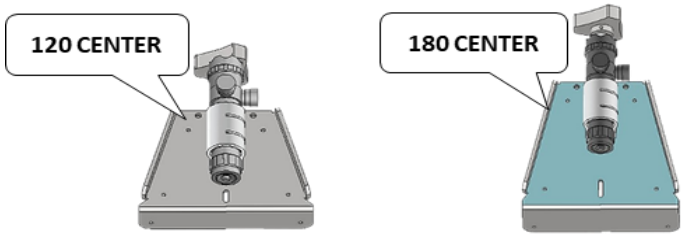
5.31 Main base plate (Ball 120cm Max & Ball 180cm)



5.32 Left and right base plate (TILT, SET 1, SET 2)

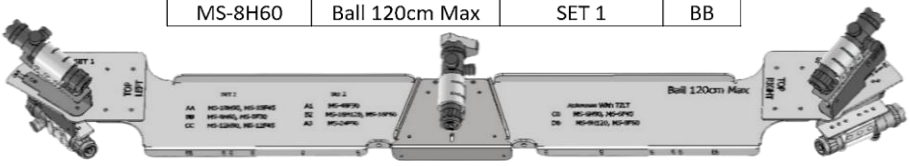


5.33 Ball 120cm and Ball 180cm center plate

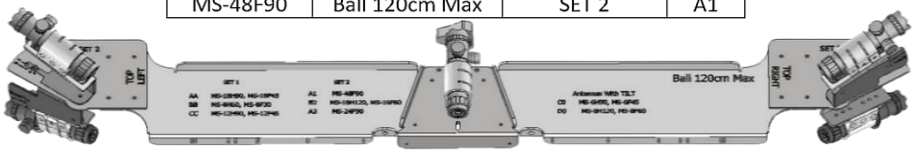


5.34 Configurated model sample (example of MS-8H60, MS-48F90, MS-8F60, MS-24H180)

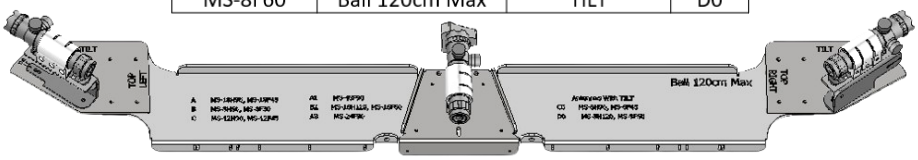
60cm Lens	Main Base Plate ID	Left/Right BP ID	Setting
MS-8H60	Ball 120cm Max	SET 1	BB



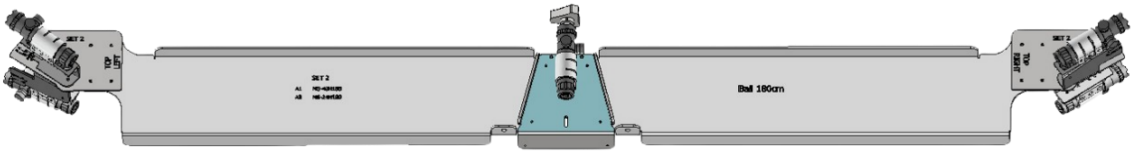
90cm Lens	Main Base Plate ID	Left/Right BP ID	Setting
MS-48F90	Ball 120cm Max	SET 2	A1



60cm Lens	Main Base Plate ID	Left/Right BP ID	Setting
MS-8F60	Ball 120cm Max	TILT	D0



180cm Lens	Main Base Plate ID	Left/Right BP ID	Setting
MS-24H180	Ball 180cm	SET 2	A3



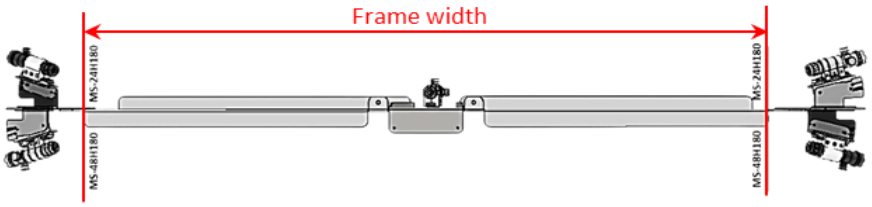
6.00 SLP antenna mounting and positioning guide

6.10 Planning and execution

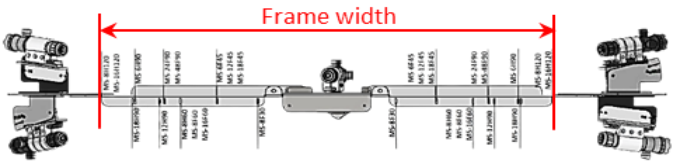
CAUTION	*Pre-assembly of the SLP for that particular antenna model's before on-site positioning and adjustment will be much helpful in reducing the work load and safety concern*

6.20 Positioning guide

6.21 Main base plate ID: " Ball 180 cm"

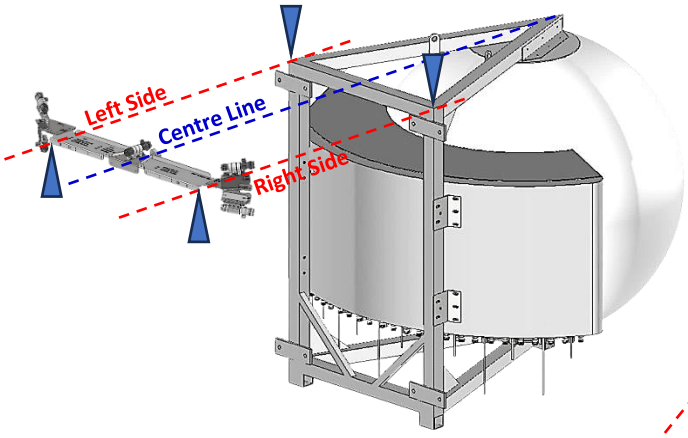


6.22 Main base plate ID: " Ball 120 cm Max"

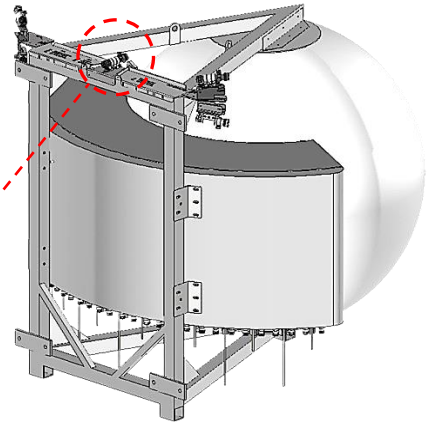


6.30 SLP mounting

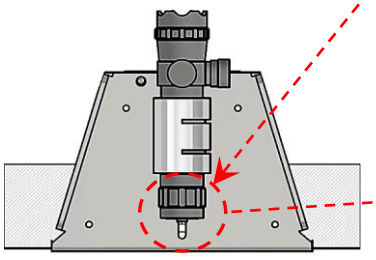
6.31 SLP and frame alignment



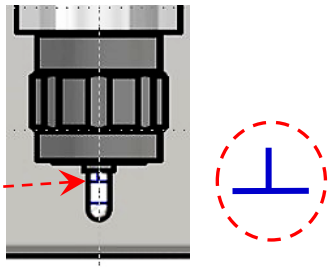
6.32 SLP Aligned and seated flat



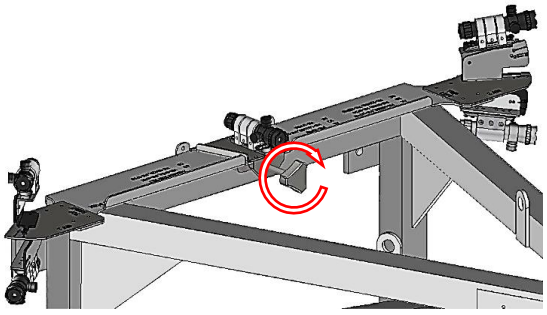
6.33 Center line check



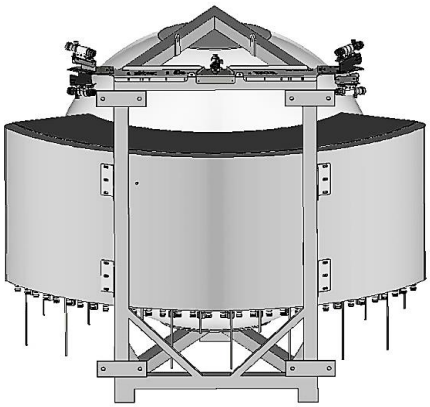
6.34 Frame center line label visible



6.35 Tighten SLP onto the frame.



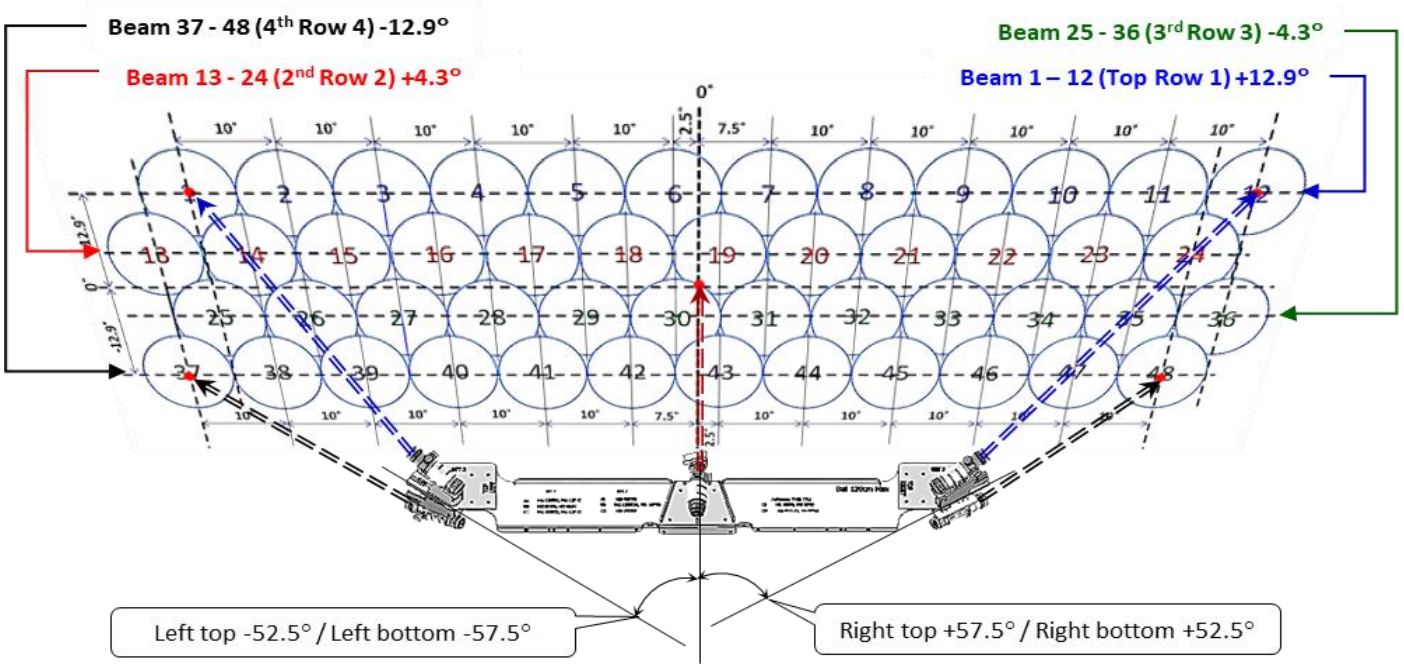
6.36 Final check/ensure all parts secured



6.40 SLP positioning guides

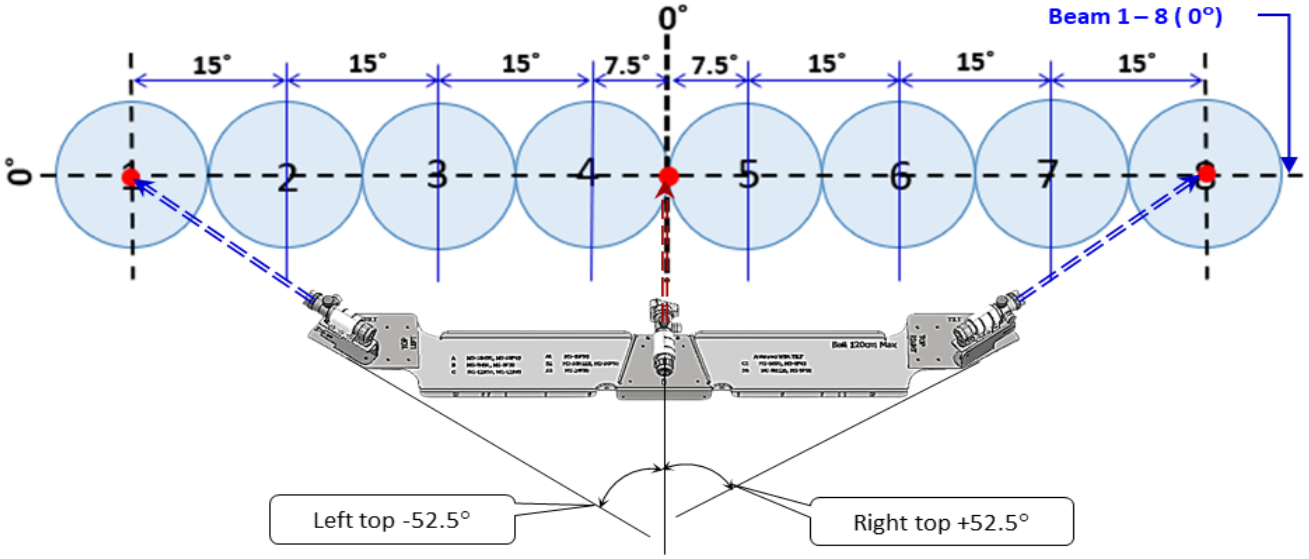
6.41 SLP laser-pointing projected view (example of MS-48F90)

Laser Position	Row Nos	Beam Nos	Angle	center Laser	Laser Position	Row Nos	Beam Nos	Angle
Left top laser	1	1	-52.5°		Right top laser	1	12	+57.5°
Left bottom laser	4	37	-57.5°	0°/0°	Right bottom laser	4	48	+52.5°

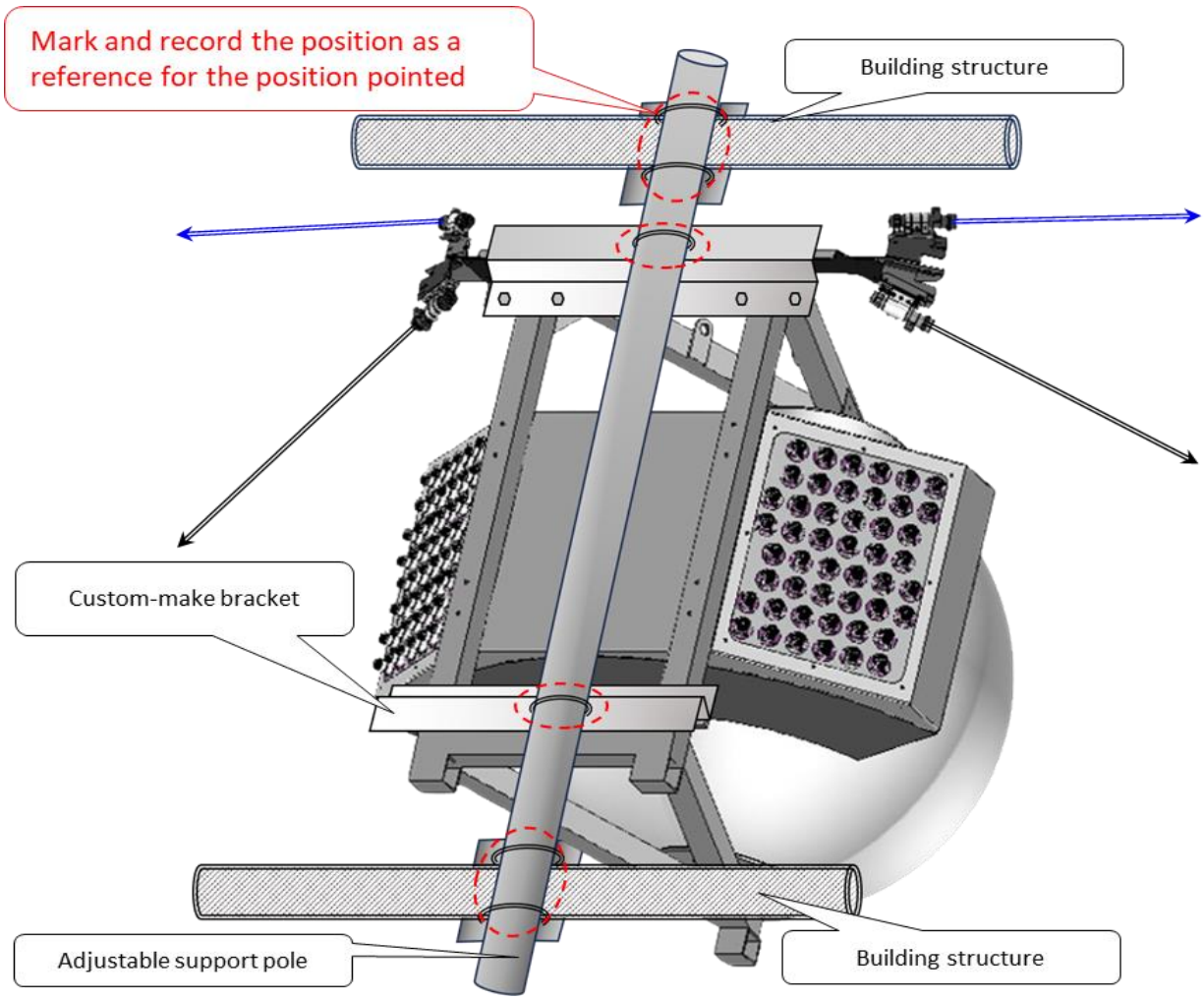


6.42 SLP laser-pointing projected view (example of MS-8F60)

Laser position	Angle	center laser	Laser position	Angle
Left top laser	-52.5°	0°/0°	Right top laser	+52.5°



6.50 Antenna position confirmed and secured with marking



Note:

1. This laser positioning is a mechanical tilt process (difference from the antenna manual or RET tilting).
2. Repeat the same process for another antenna positioning