MATSING®

LENS TECHNOLOGY ENABLED

LSA Installation & Alignment General Guide

(Large Sphere Antenna - Date: 11-Sep-2024, Revison 1)

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LENS TECHNOLOGY ENABLED

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Revision History:

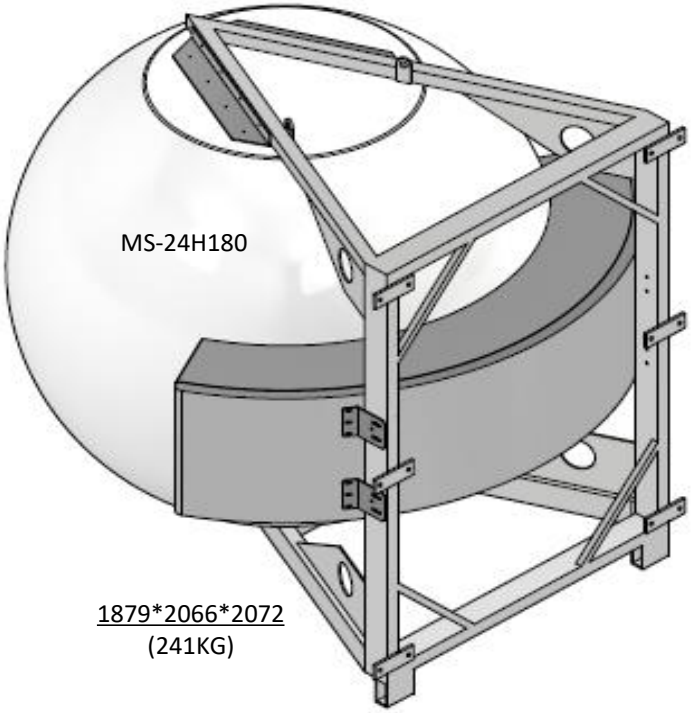
Date	*Description*	*Rev By*	*Check By*	*Rev no*
18-May-2024	*Initial Release*	*RL*	*Pavel*	*0*
11-Sep-2024	*Include LSA models and general update*	*RL*	*Pavel*	*1*

1.00 Large sphere antenna's (LSA) product overview

1.10 LSA height, width, depth (in mm), KG

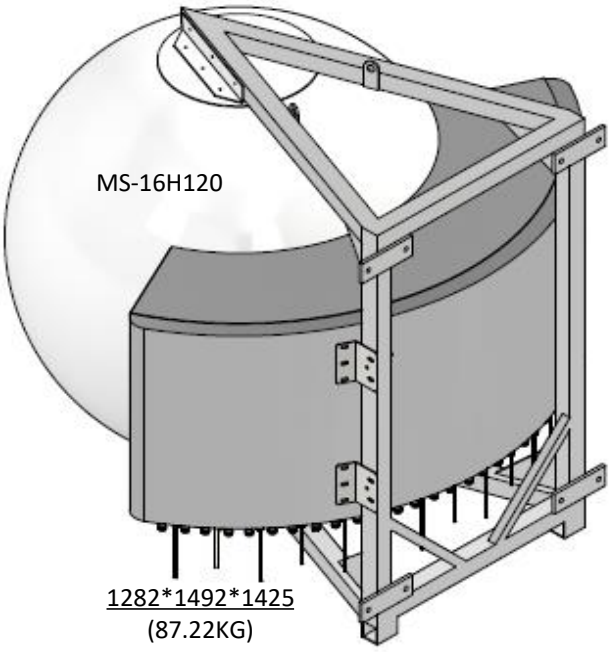
1.11 180cm lens antenna & models

1	MS-48H180	5	MS-12T180	9	MS-12.6DB180
2	MS-24H180	6	MS-12L180	10	MS-6T180
3	MS-24C180-I	7	MS-12H180	11	MS-6L180
4	MS-24C180	8	MS-12.6DB180-T		



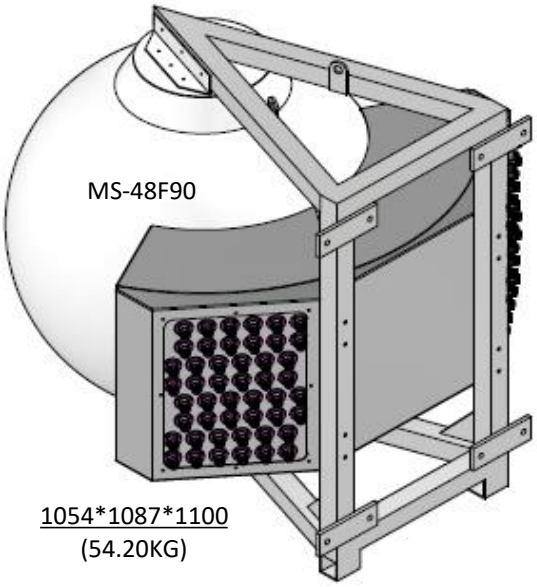
1.12 120cm lens antenna & models

1	MS-16H120	3	MS-8L120	5	MS-8.4DB120-T
2	MS-8T120	4	MS-8H120	6	MS-8.4DB120



1.13 90cm lens antenna & models

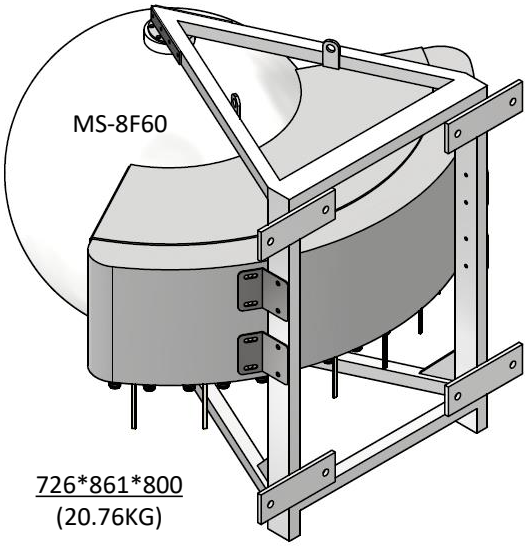
1	MS-48F90	7	MS-12F90
2	MS-48C90	8	MS-12C90
3	MS-24F90	9	MS-9SH90-FWB-S
4	MS-24C90	10	MS-9H90-FWB2.3
5	MS-18H90	11	MS-6H90
6	MS-12H90	12	MS-6.3DB90-T



1054*1087*1100
(54.20KG)

1.14 60cm lens antenna & models

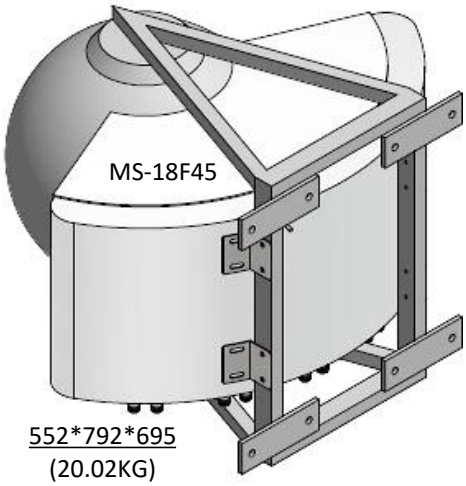
1	MS-24F60	5	MS-8C60 (S)
2	MS-16F60	6	MS-4H60
3	MS-8H60	7	MS-4.2DB60-T
4	MS-8F60	8	MS-4.2DB60



726*861*800
(20.76KG)

1.15 45cm lens antenna & models

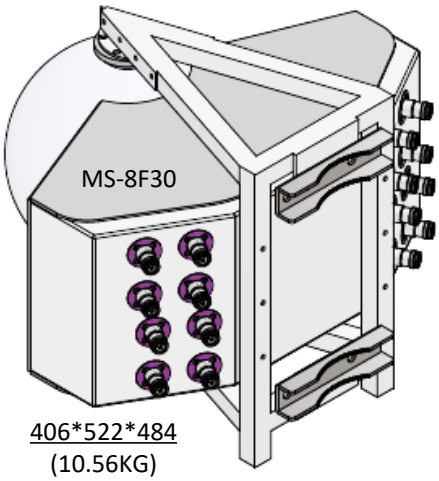
1	MS-18F45	4	MS-12C45
2	MS-18C45	5	MS-6F45
3	MS-12F45	6	MS-6C45



552*792*695
(20.02KG)

1.16 30cm lens antenna & models

1	MS-8F30	2	MS-4F30



406*522*484
(10.56KG)

2.00 LSA unloading, transportation, and unpacking

2.10 Safety precaution

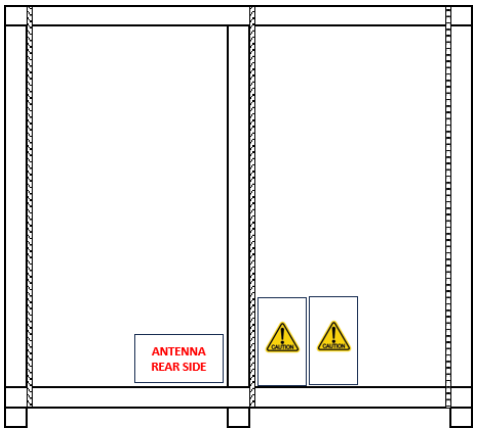
Strictly comply with the authority and regulatory on workplace safety and health control and measure when performing unloading/loading, lifting, and transporting of large or heavy equipment. Appropriate material handling machinery, equipment's, safety harnesses, and tools should be used, and only certified personnel should perform the task.

2.20 LSA antenna wooden crate lifting and handling caution point *(90 to 180cm lens)*

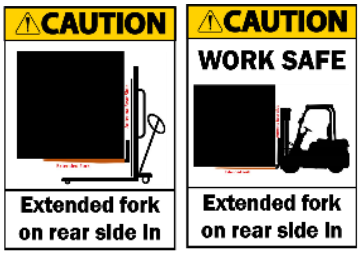
1) To prevent unbalance during lifting/moving for antenna's lens with 90 cm, 120 cm, and 180 cm, lifting fork "ONLY" entry from antenna's "REAR SIDE"

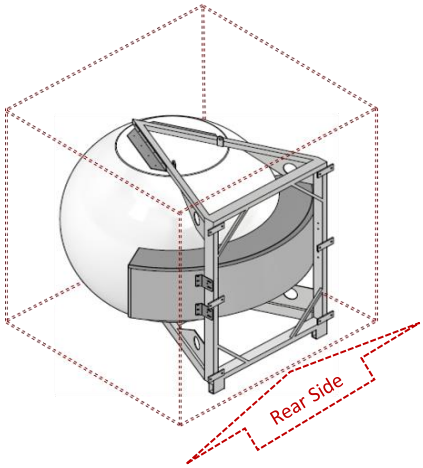
2) "Extended fork "MUST" be use for lifting/moving and the length shall not ee exceed 1.5 times the lifting fork

2.21 Unloading, transportation, and unpacking (e*xample of MS-24H180*)

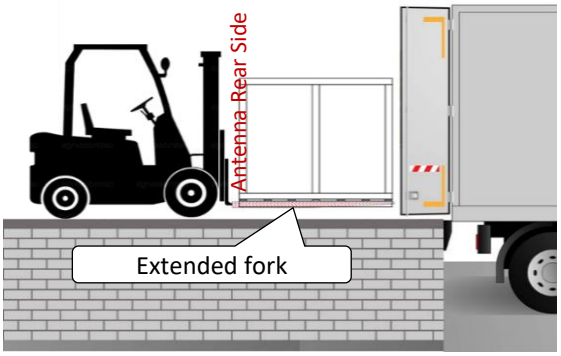


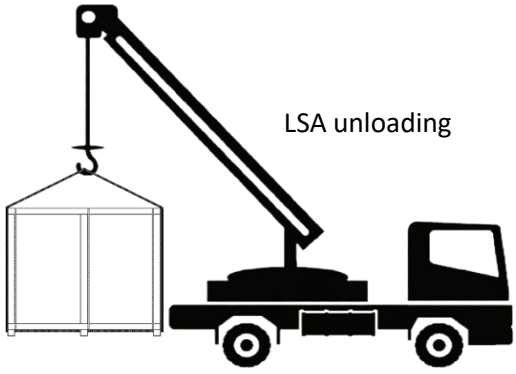
Antenna rear side label



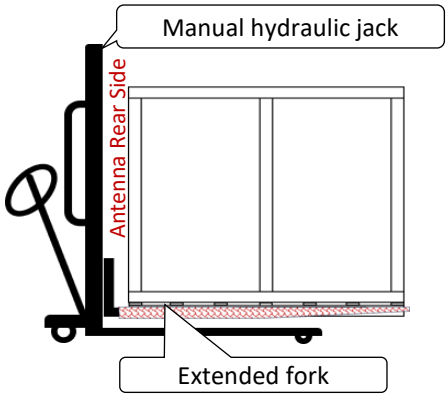


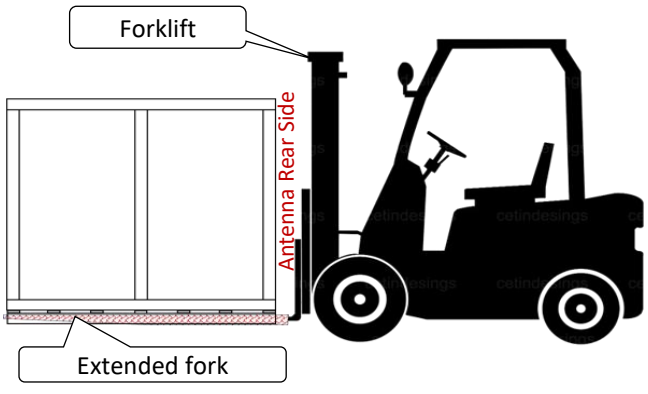
2.22 Unloading using a crane truck, manual hydraulic jack, or forklift





2.23 Point to Point transport by manual hydraulic jack or forklift





2.24 Wooden crate unpacking tools and steps (e*xample of MS-24H180*)

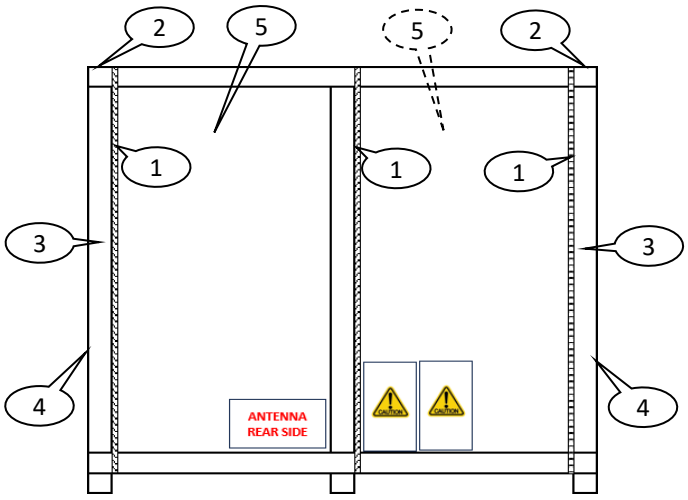
Unpacking tools

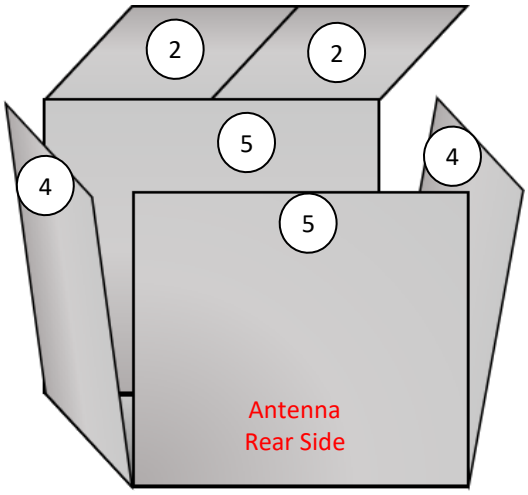
Craw bar

Cutter

Electric driver

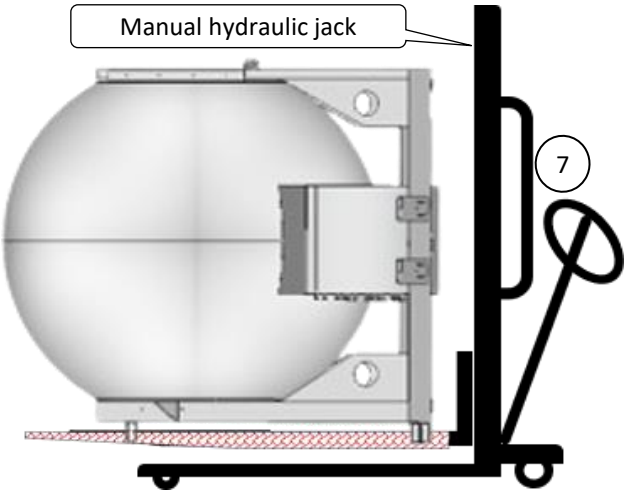
MS-24H180 Unpacking Step	
Step 1	Use a cutter cut and remove plastic straps.
Step 2	Unscrew and remove top panel.
Step 3	Unscrew left and right side to remove rear panel.
Step 4	Remove left and right side panels.
Step 5	Remove front and rear panels.





Step 6	Unwrapping shrink wrap.

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



3.00 LSA lifting and installtions

3.10 LSA lifting equipment preparations

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

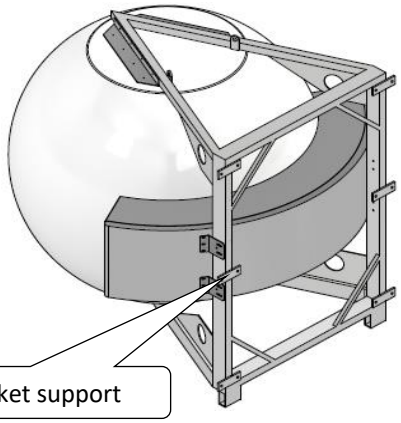
3.20 Lifting planning and execution

CAUTION	*The installation and operations specialist shall plan the execution works according to the workplace safety and health control measure with the trained and certified staff in handling transportation, lifting, installation, and leveling of antennas.*

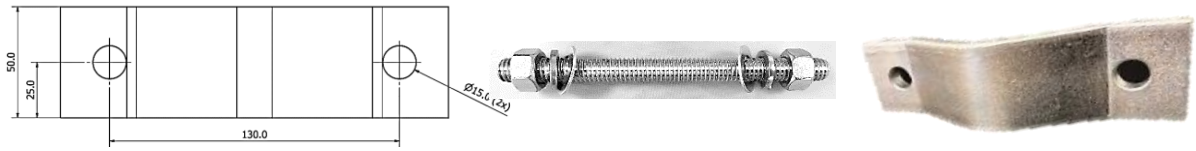
3.30 LSA lifting and installation

3.31 LSA antenna frame bracket support

Lens Size	L x W (mm)	Thickness (mm)	Holes Size (mm)	Holes 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				



Frame mounting bracket and fitting

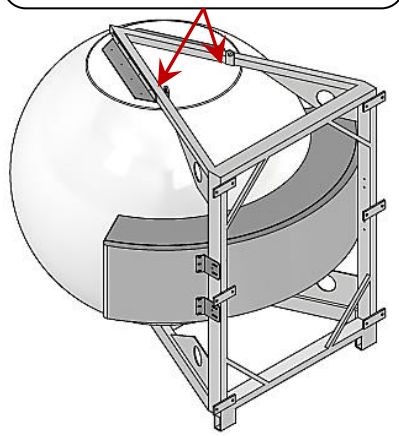


3.32 Additional supporting bracket (end user custom-make)

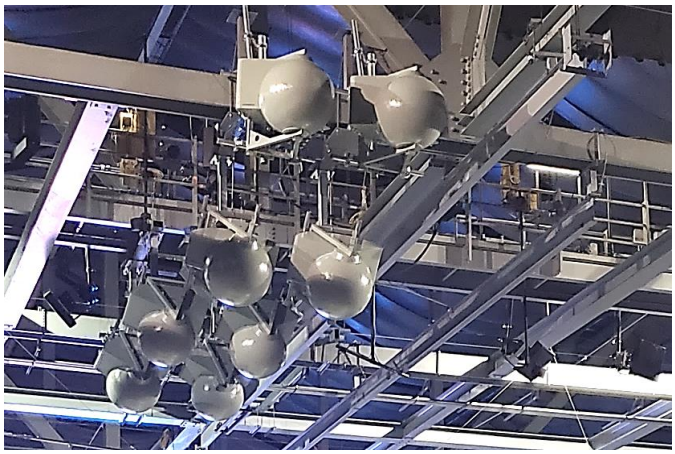
<u>Important Notes:</u> The end user is required to custom-make the additional supporting bracket and tighten the existing antenna bracket to meet the deployment needs.

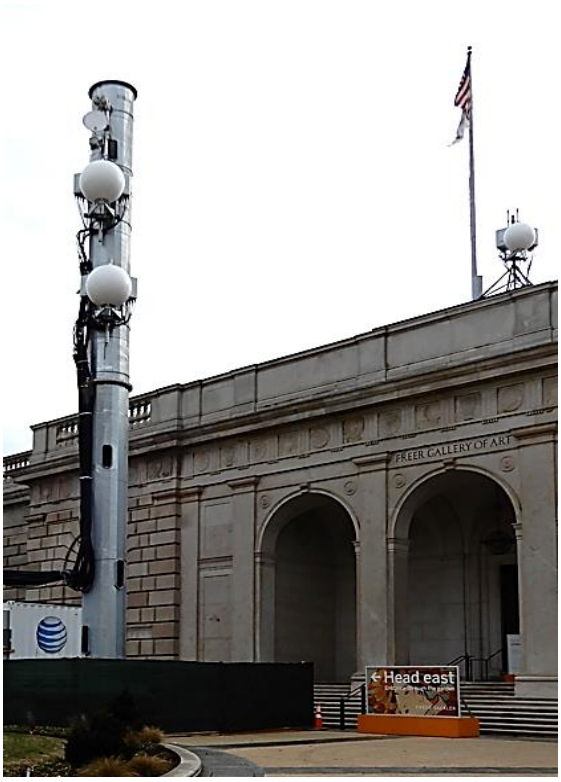
3.33 Lifting or hoisting up the antenna

Hook points located at the center of gravity



3.34 LSA antenna installation (sample picture of antenna installed on-site)



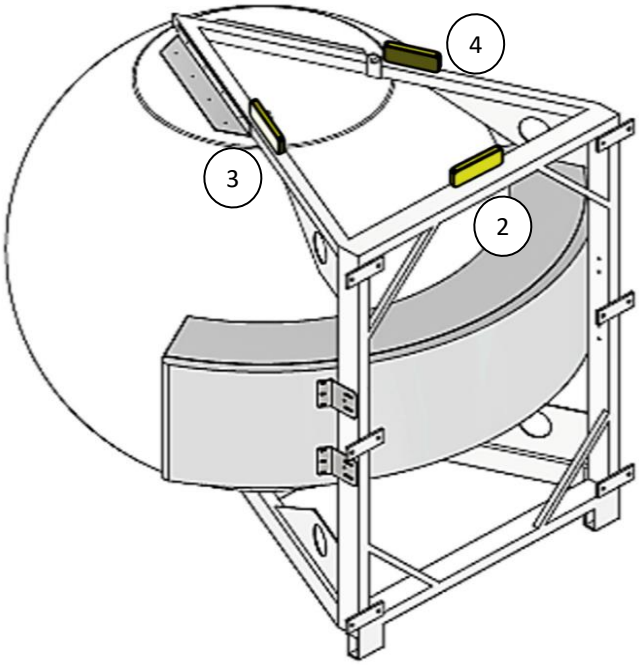


3.35 LSA antenna leveling steps (for horizontal setting)

Step 1	Digital gauge calibration to zero "0" level

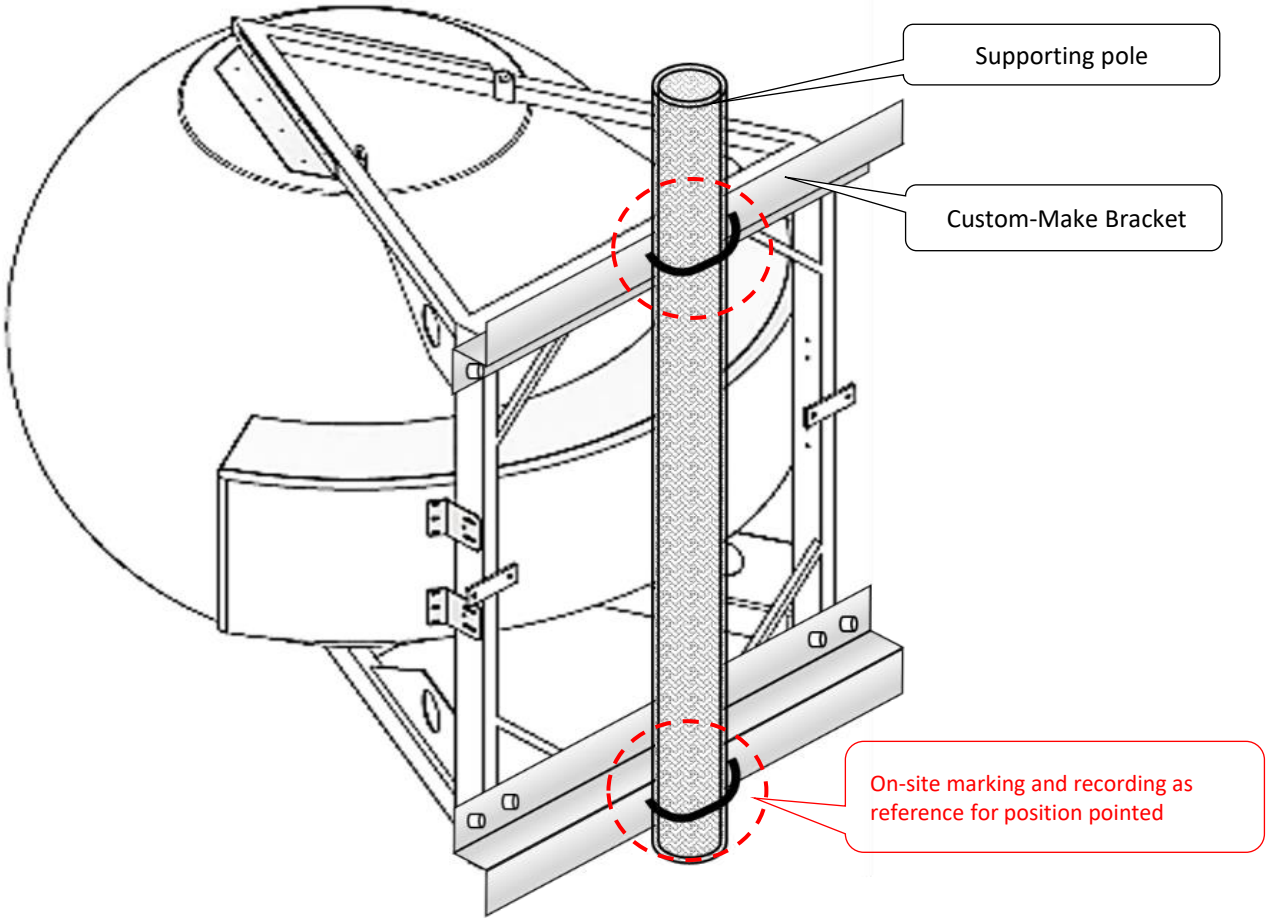
Target level is 0˚ (zero) ≤0.2˚	
Step 2	Place the digital gauge on the rear frame top center.
Step 3	Place the digital gauge on the right frame top center.
Step 4	Place the digital gauge on the left frame top center.

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



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

3.36 Antenna leveled, secure, and marking



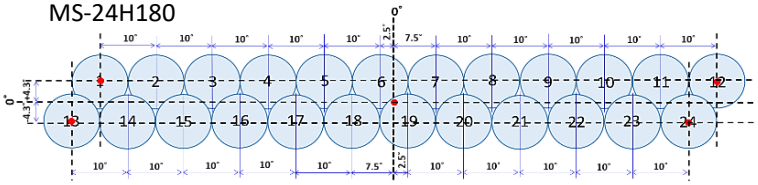
4.00 LSA product formation

4.10 LSA product configurations (example models)

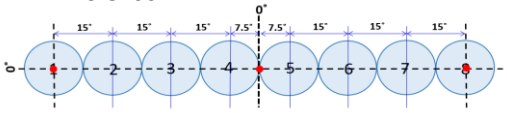
Model	Lens Size	Band	Frequency	Nos of Rows	Beam/Row	Left Top Angle	Left Top Angle	Row Nos	Tilt Up	Row Nos	Tilt Down
MS-24H180	180	H	1695-2690 MHz	2	12	52.5°	57.5°	1	-4.3°	2	4.3°
MS-16H120	120	H	1695-2690 MHz	2	8	56.2°	48.8°	1	-6.5°	2	6.5°
MS-48F90	90	F	3300-4200 MHz	4	12	52.5°	57.5°	1	-12.9°	4	12.9°
MS-8F60	60	F	3300-4200 MHz	1	8	52.5°	52.5°				
MS-18F45	45	F	3300-4200 MHz	3	6	55°	45°	1	-17°	3	17°
MS-8F30	30	F	3300-4200 MHz	2	4	52.5°	37.5°	1	-13°	2	13°

4.20 LSA beam's projection

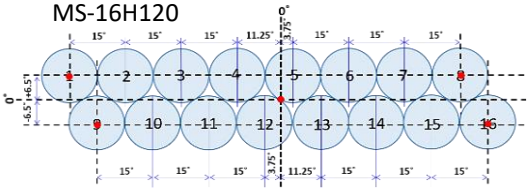
MS-24H180



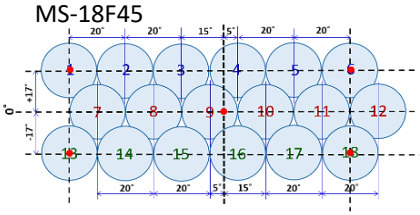
MS-8F60



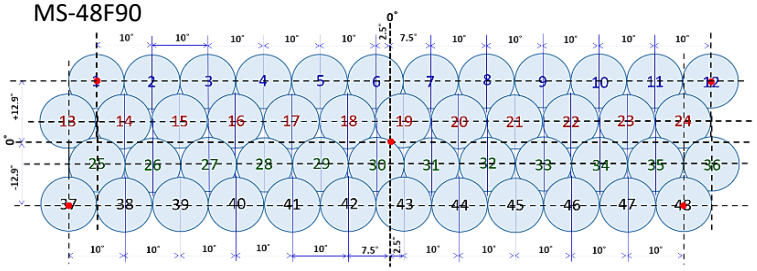
MS-16H120



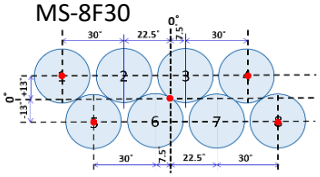
MS-18F45



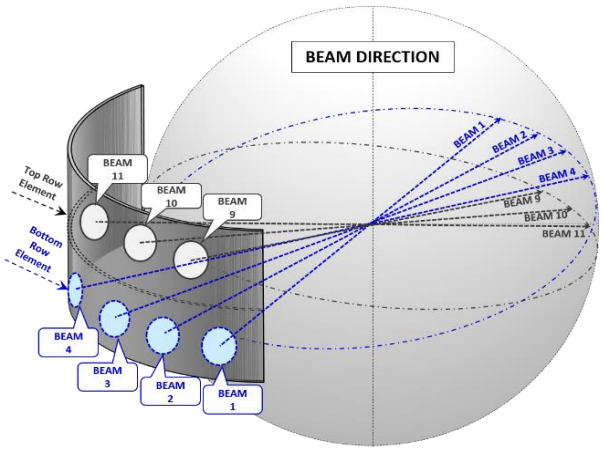
MS-48F90

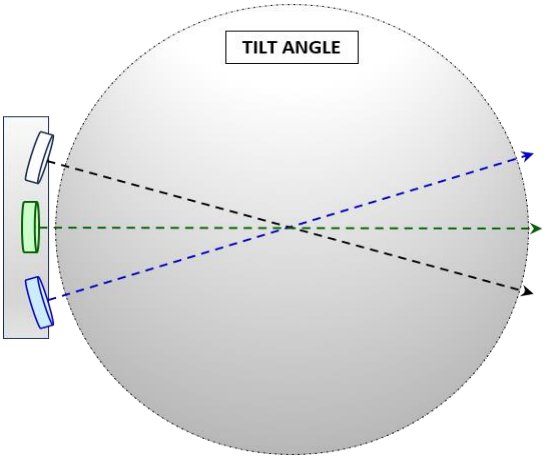


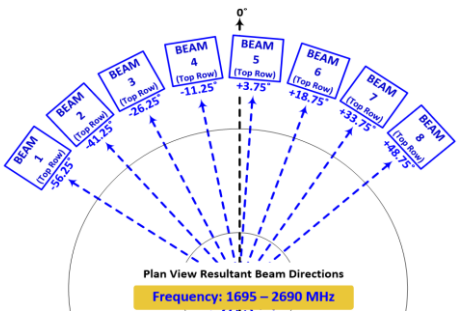
MS-8F30

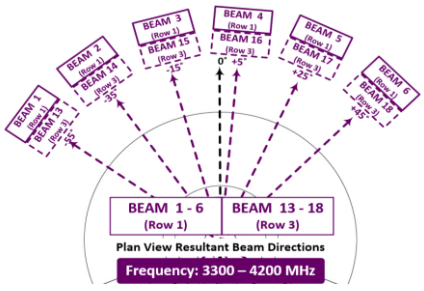


4.30 LSA example of a beam's directions (azimuth) or tilt angle (elevation).









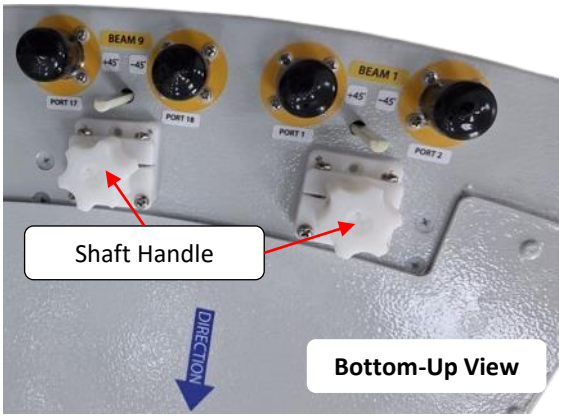
5.00 LSA tilt adjustment (elevation)

5.10 Planning and execution

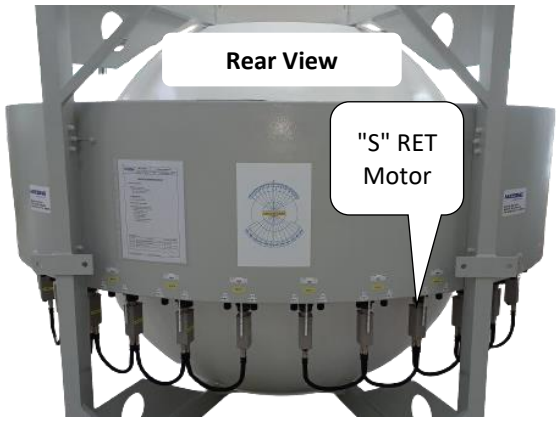
CAUTION	*Installation specialists have the option to pre-tilt the antenna angle before the lifting and installation of the antenna. That may help in reducing the work load and safety concern when performing adjustment on-site.*

5.20 Antenna tilt configuration types (elevation angle)

5.21 Manual tilt adjustment (product view) (*Example of MS-16H120*)

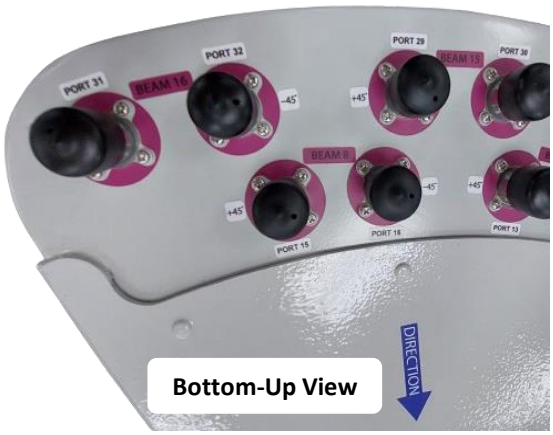


5.22 RET tilt adjustment (product view) (*Example of MS-12H180*)



5.23 Fixed tilt-factory set (product view) (*Example of MS-48F90*)

5.24 Fixed tilt-factory set (product view) (*Example of MS-16F60*)



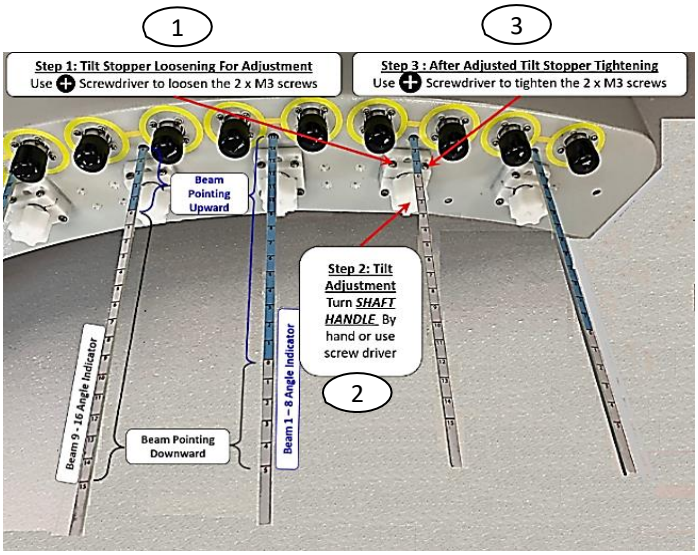
5.30 Manual tilt adjustment tools and steps (example of MS-16H120)

Adjustment tools

"+" Screw driver

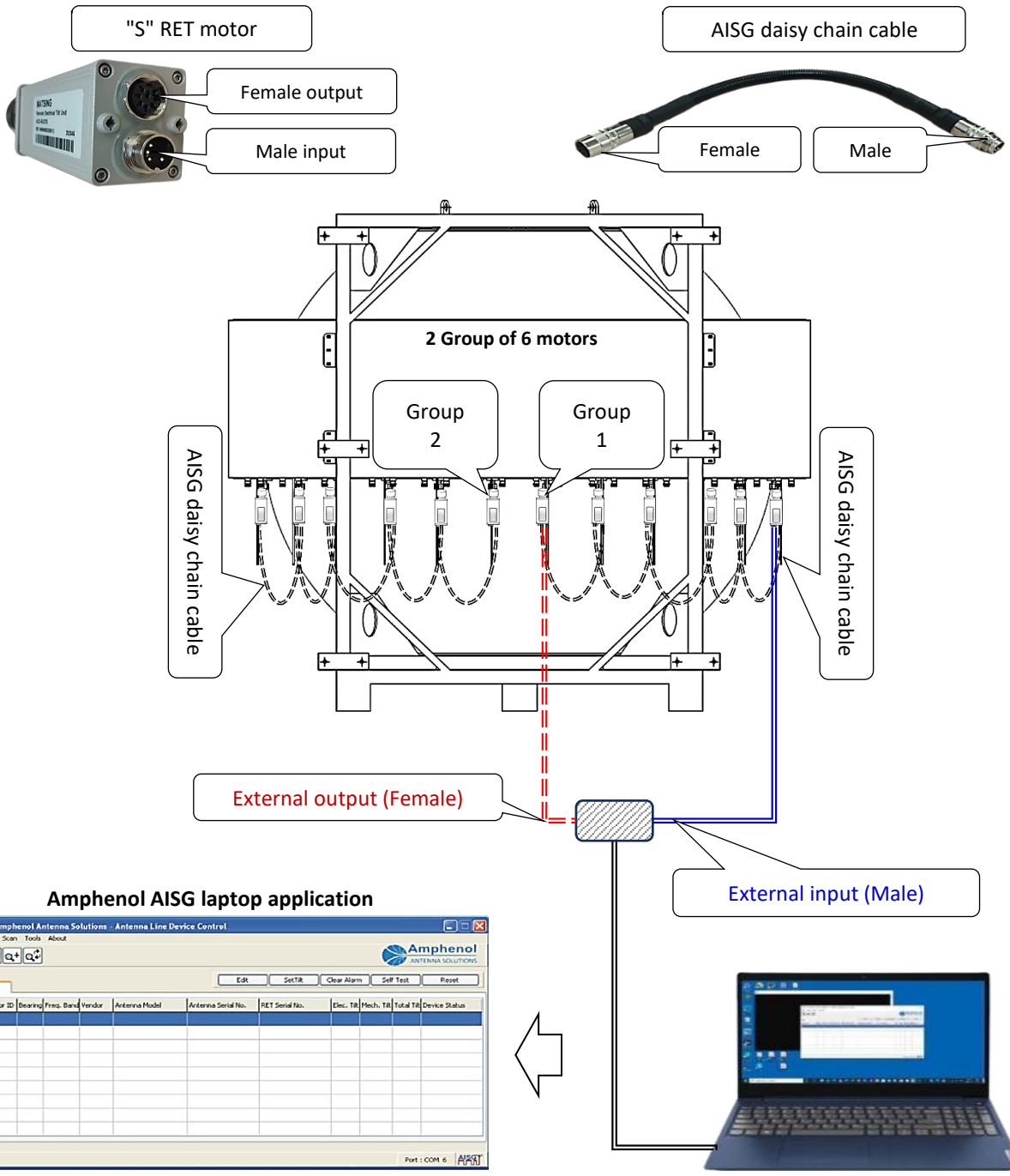
Electric driver

MS-16H120 Manual tilt adjustment	
Step 1	Tilt stopper loosening for adjustment
Step 2	Turn the shaft handle by hand or use a screwdriver.
Step 3	After adjusted tilt stopper tightening



5.40 "S" RET motor connection and operations (example of MS-12H180 sn: #10)

5.41 Motor installation and connection



5.42 RET operations/information

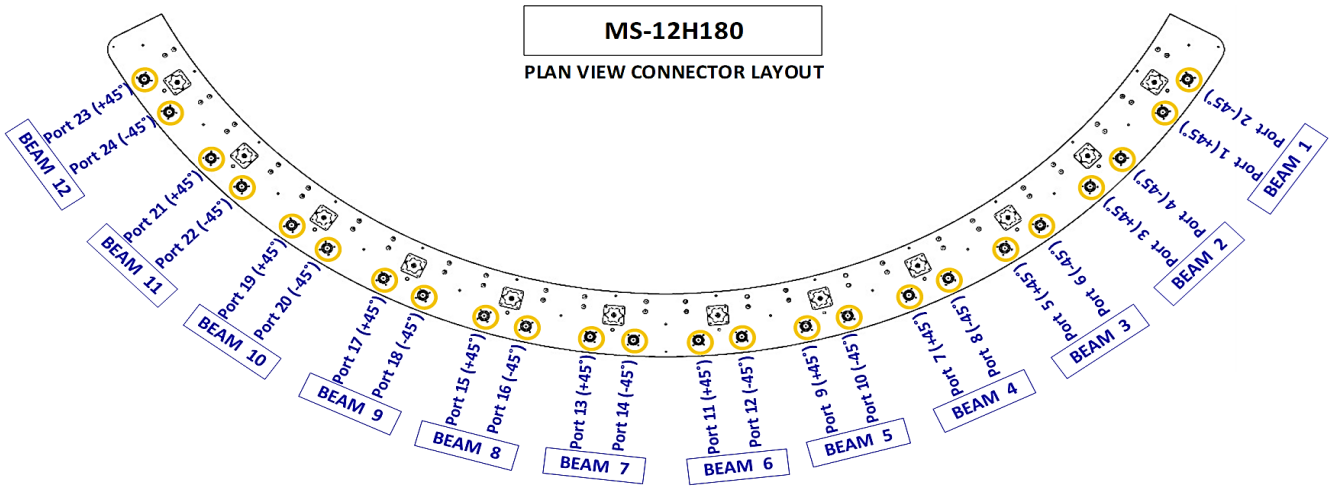
A standard AISG 2.0 compliant cable (not included) is used to connect the MDCU to the AISG interface control. Once connected, use an AISG 2.0-compliant control software to perform a subunit SCAN to identify the RET elements.

5.43 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 if the serial numbers
If is shorter than 7 digits

5.44 Plan view connector layout

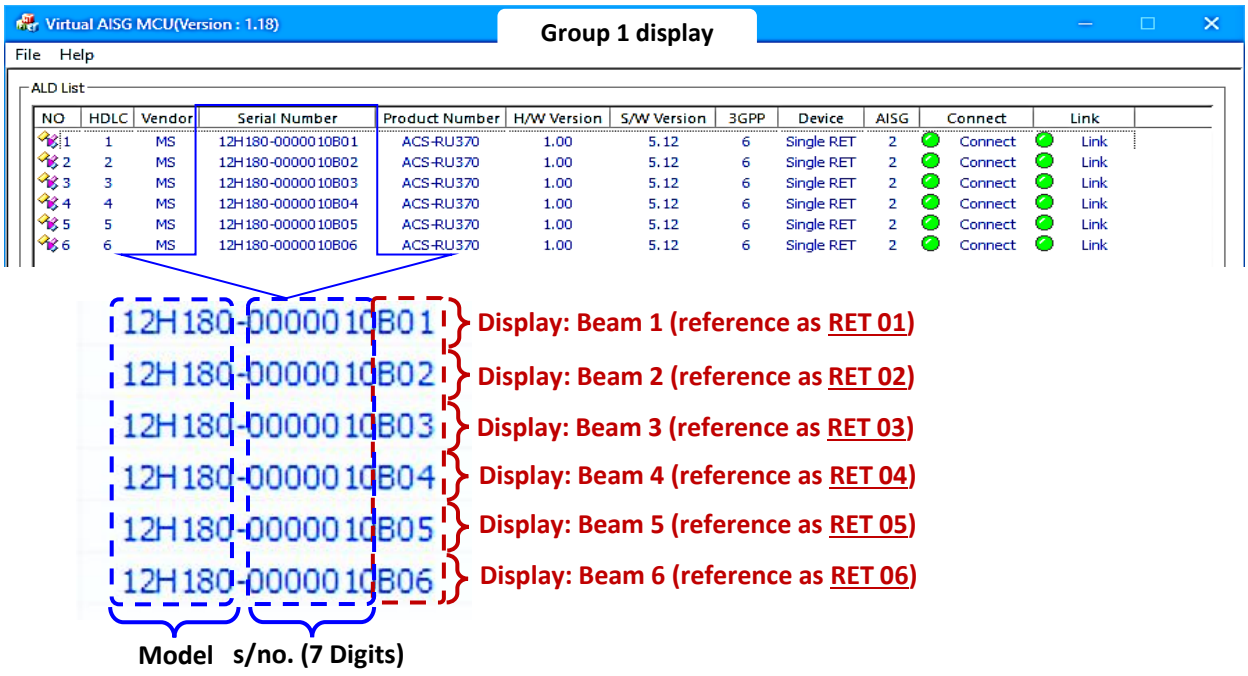


5.45 Antenna connector port table

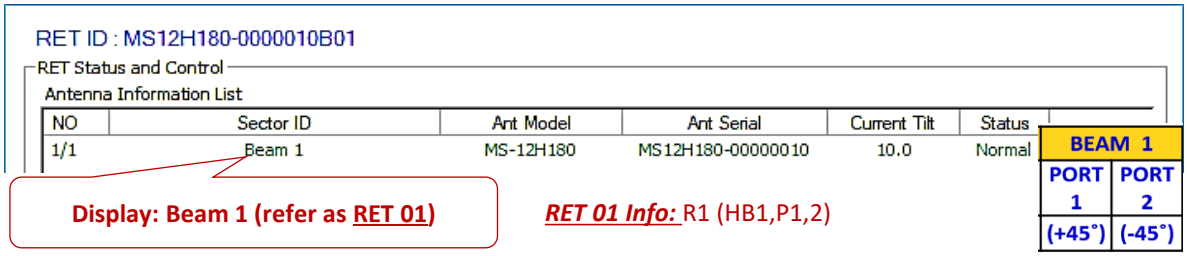
BEAM 6		BEAM 5		BEAM 4		BEAM 3		BEAM 2		BEAM 1	
PORT 11	PORT 12	PORT 9	PORT 10	PORT 7	PORT 8	PORT 5	PORT 6	PORT 3	PORT 4	PORT 1	PORT 2
(+45°)	(-45°)	(+45°)	(-45°)	(+45°)	(-45°)	(+45°)	(-45°)	(+45°)	(-45°)	(+45°)	(-45°)

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°)

5.46 Group 1 display information and reference



5.47 Group 1 beam numbers and port numbers display



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°)

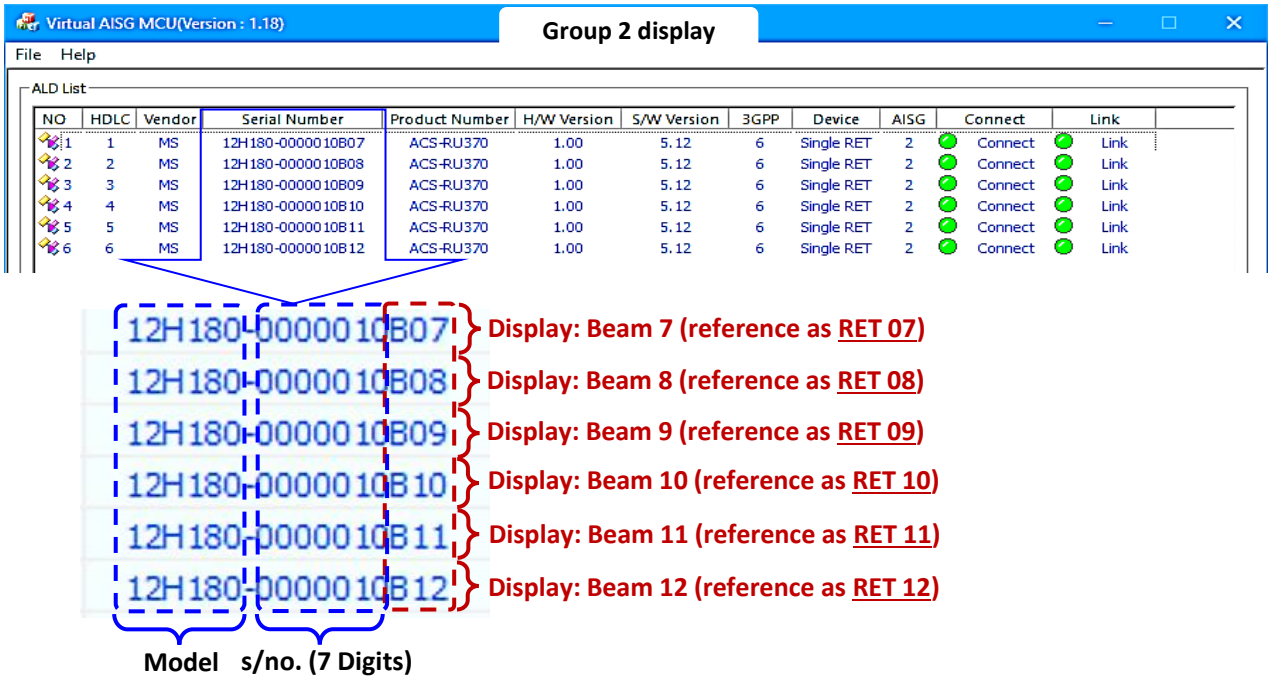
RET 05 Info: R5 (HB5,P9,10)

BEAM 5	
PORT 9	PORT 10
(+45°)	(-45°)

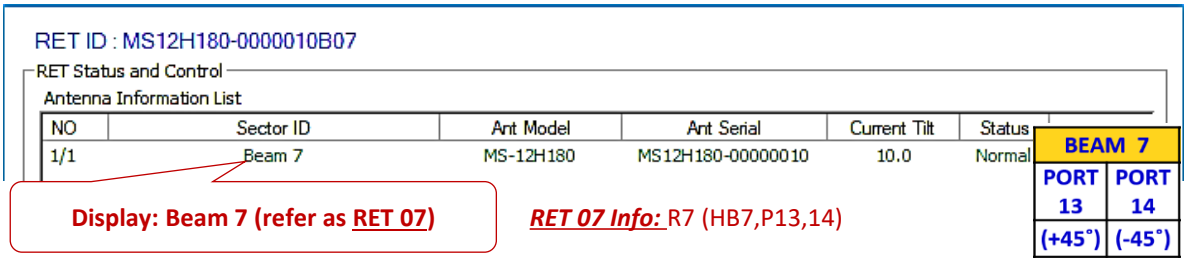
RET 06 Info: R6 (HB6,P11,12)

BEAM 6	
PORT 11	PORT 12
(+45°)	(-45°)

5.48 Group 2 display information and reference



5.49 Group 2 beam numbers and port numbers display



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)

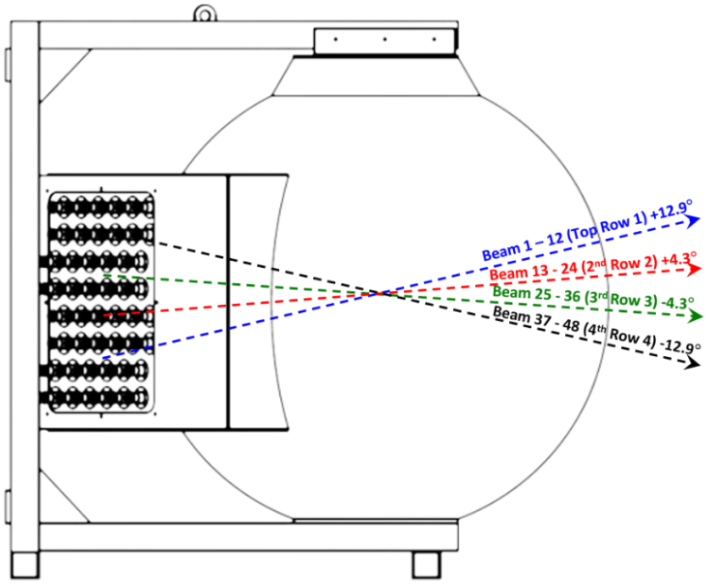
BEAM 11	
PORT 21	PORT 22
(+45°)	(-45°)

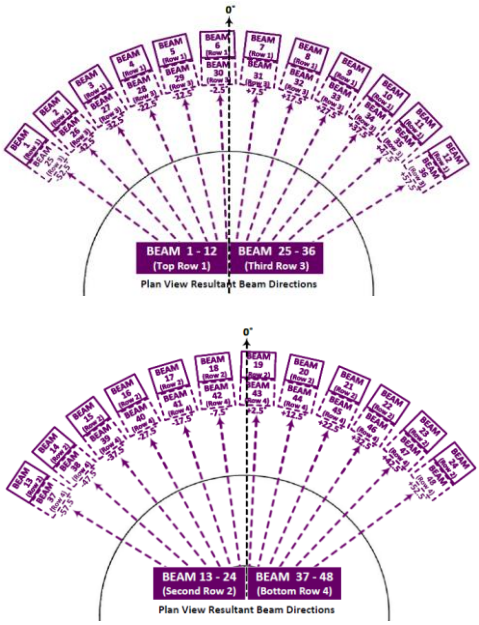
RET 12 Info: R12 (HB12,P23,24)

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

5.50 Fixed tilt-factory set (example of MS-48F90)

5.51 Beam tilt angle (elevation) 5.52 Beam direction angle (azimuth)





6.00 LSA stadium laser pointer (SLP) overview

6.10 Applicable antenna models (example of MS-SLP-AXX Series)

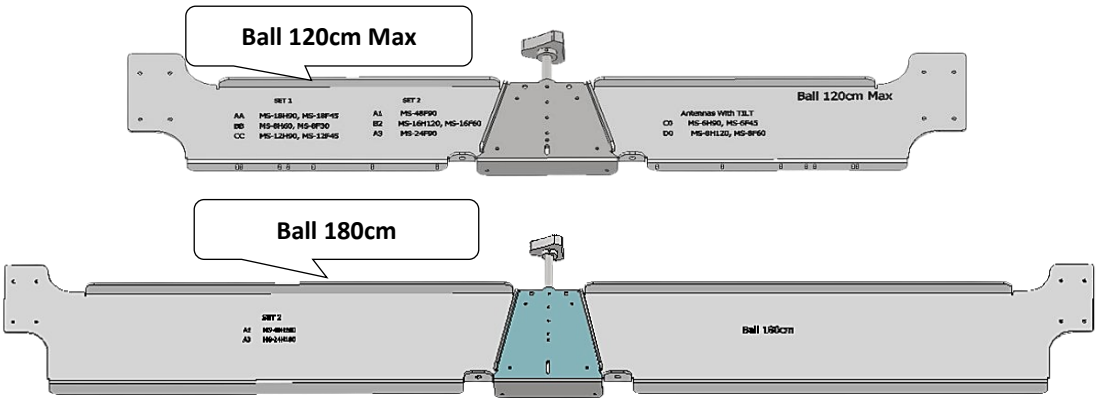
1	MS-18H90	5	MS-12H90	9	MS-8H120		13	MS-16H120
2	MS-18F45	6	MS-12F45	10	MS-8F60		14	MS-16F60
3	MS-8H60	7	MS-6H90	11	MS-48H180		15	MS-24H180
4	MS-8F30	8	MS-6F45	12	MS-48F90		16	MS-24F90

6.20 Model setting and assembly configuration table

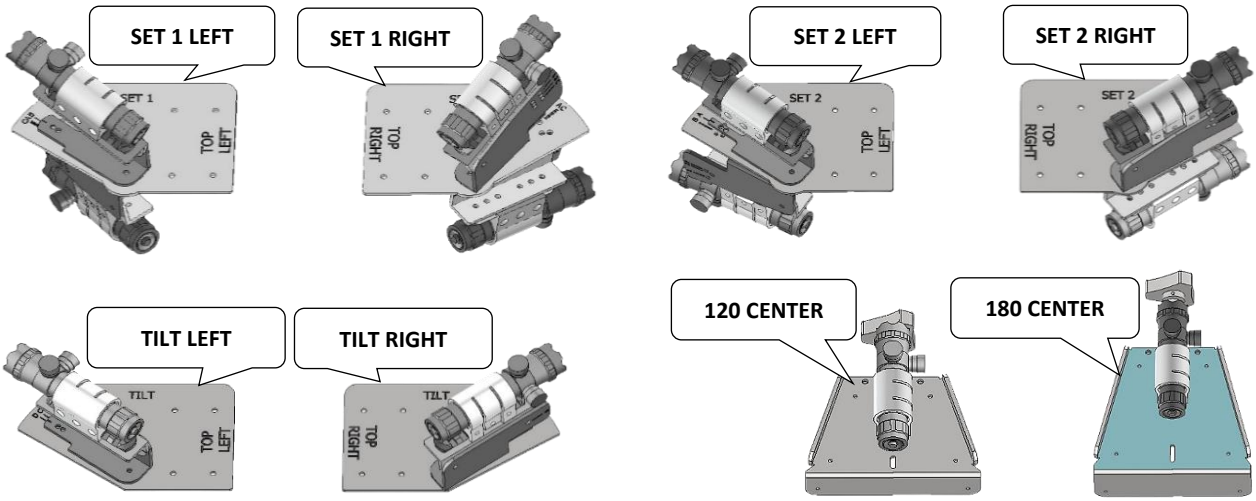
Setting	Model	Frame Width	Main Base Plate ID	Left & Right Base Plate ID	Left Top Angle	Right Top Angle	Nos of Rows	Tilt Up	Row nos	Tilt Down	Row nos
AA	MS-18H90	620.00 (24.41")	Ball 120cm Max	SET 1	55	45	3	-17	Row 1	17	Row 3
	MS-18F45	350.80 (13.81")			55	45	3	-17	Row 1	17	Row 3
BB	MS-8H60	466.82 (18.38")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

6.30 SLP parts description and configuration overview

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

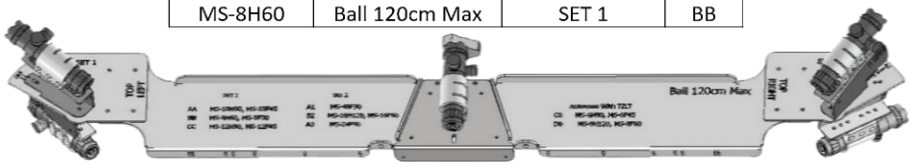


6.32 Left/Right base plate (TILT, SET 1, SET 2) & 120/180 center plate

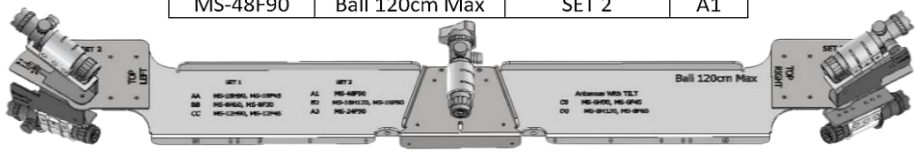


6.33 Configurated model sample (e*xample of MS-8H60, MS-48F90, MS-8F60, MS-24H180*)

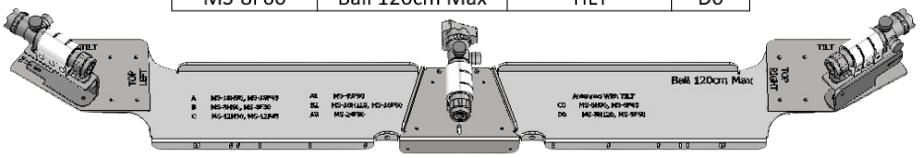
60cm Lens	Main Base Plate ID	Left/Right BP ID	Setting
MS-8H60	Ball 120cm Max	SET 1	BB



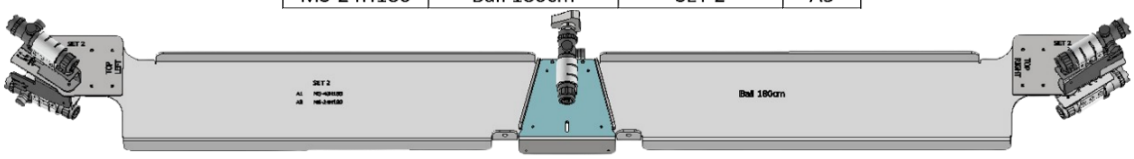
90cm Lens	Main Base Plate ID	Left/Right BP ID	Setting
MS-48F90	Ball 120cm Max	SET 2	A1



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



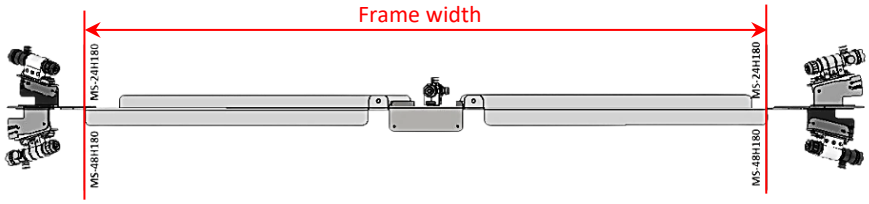
7.00 SLP mounting-on antenna and positioning guide

7.10 Planning and execution

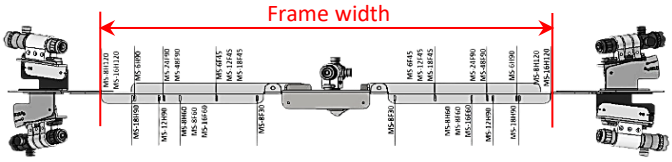
CAUTION	*Installation specialists should plan the mounting and adjustment works on deployed antenna models; advance on antenna model SLP assembly and configuration will be much helpful in reducing on-site assembly work load and safety concern.*

7.20 SLP positioning guide

7.21 Main base plate ID: " Ball 180 cm"

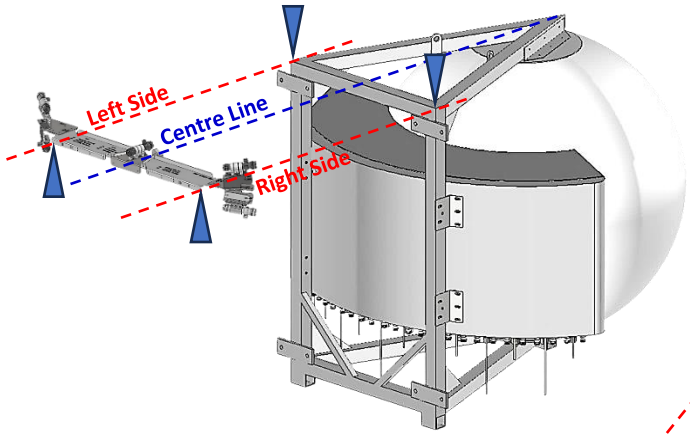


7.22 Main base plate ID: " Ball 120 cm Max"

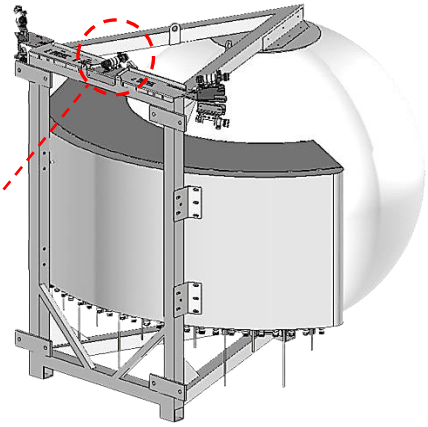


7.30 SLP mounting

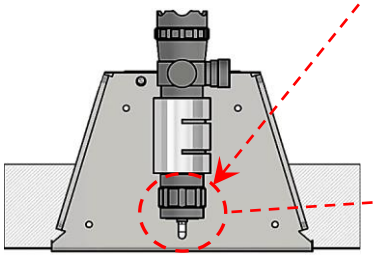
7.31 SLP and frame alignment



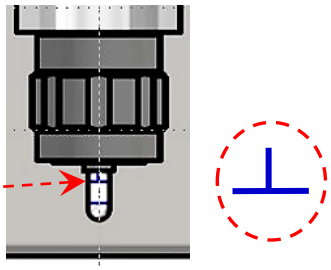
7.32 SLP Aligned and seated flat



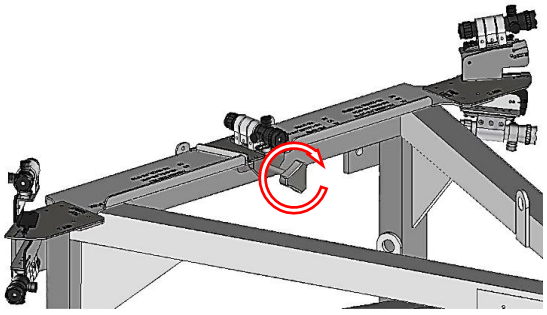
7.33 Center line check



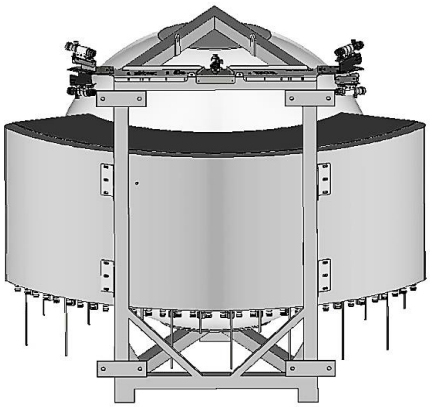
7.34 Frame center line label visible



7.35 Tighten SLP onto the frame.



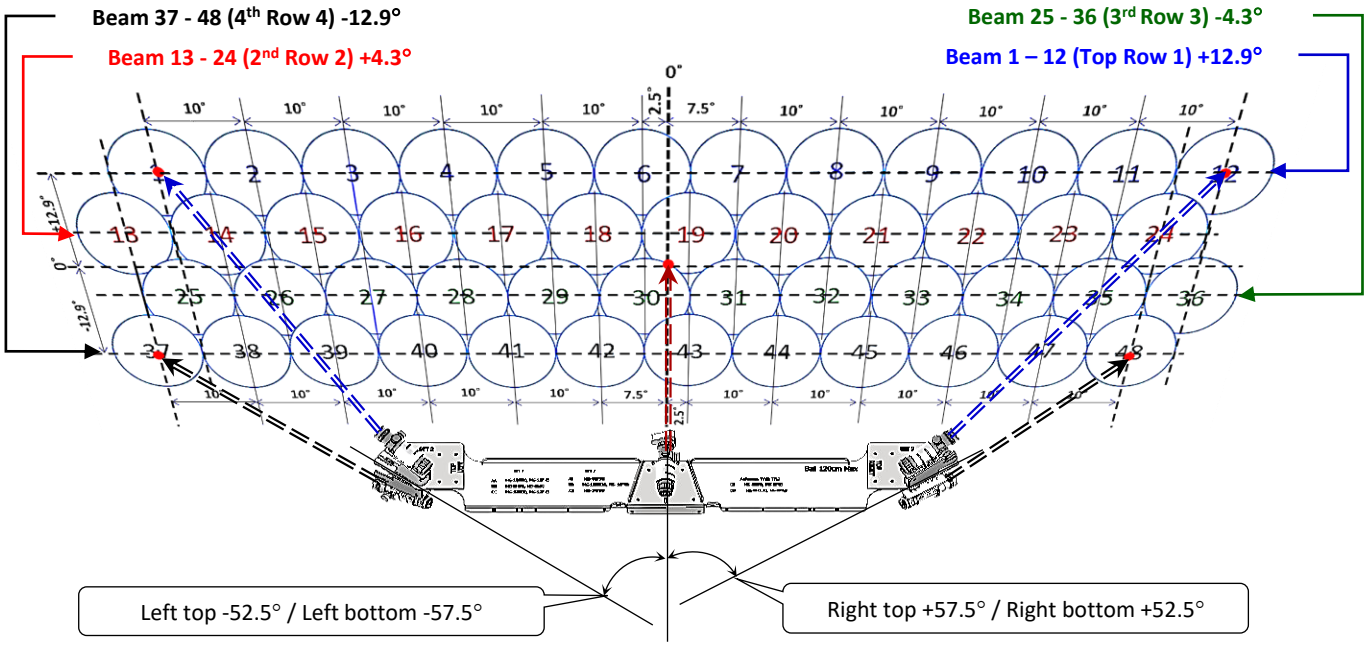
7.36 Final check/ensure all parts secured



7.40 SLP pointing guide line

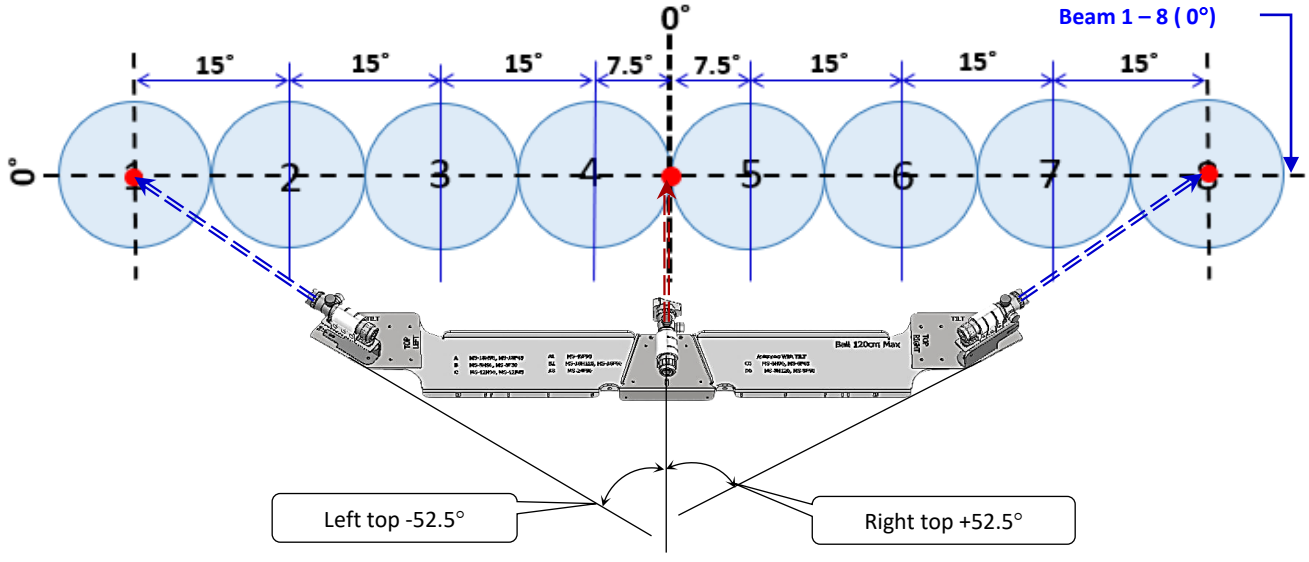
7.41 SLP laser-pointing projected view (example of MS-48F90)

Laser Position	Row Nos	Beam Nos	Angle	Centre 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°



7.42 SLP laser-pointing projected view (e*xample of MS-8F60*)

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



7.50 LSA antenna position confirm and secure with marking

(Repeat same process for another antenna positioning.)