



## ENGINEERING DEPARTMENT

Project

**Enel Green Power Torino**

Document

**Assembly Manual Enel Green Power Torino 2x45**

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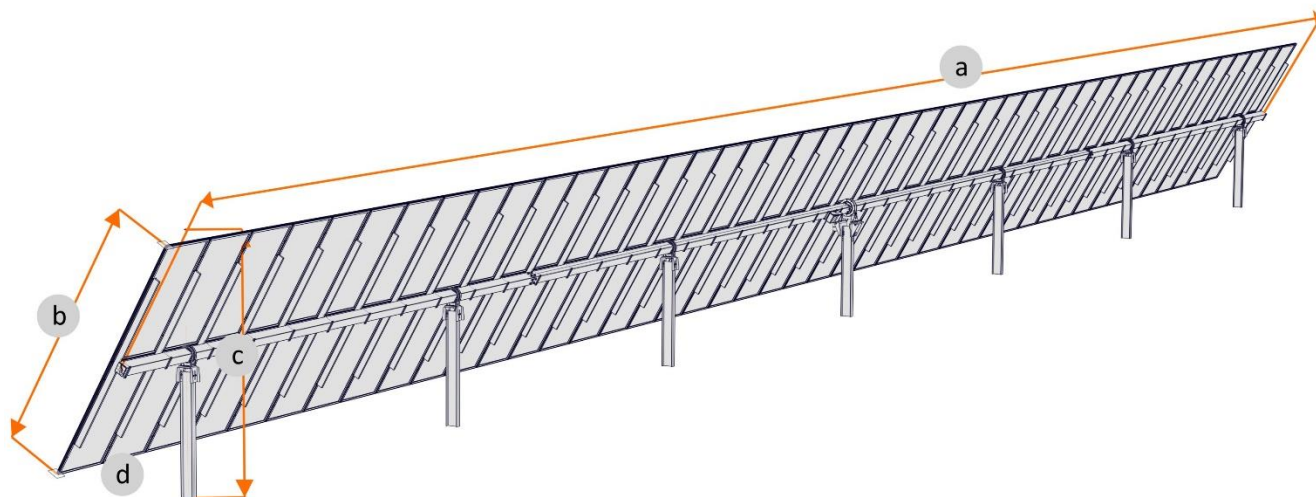
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## 1 Introduction

### 1.1 General overview




Configuration 2x45	Dimension	SI Metric (m)	US Decimal (inch)
	a	45.08	1774.8
* Max. Height with tracker at 60°	b	3.92	154.3
	c*	3.92	164.9
** Min. Height with tracker at 60°	d**	0.5	19.7

## 1.2 Mechanical and electrical ratings

Model	SF Utility Single Pile
PV module mounting :	Unrated
Design load rating:	N/A
PV module grounding :	Yes (1)
Maximum PV system voltage:	1500 Vdc
Max. system overcurrent protection :	20 A
Environmental Ratings (electrical enclosures)	Type 3X

Rating – Drive	
Input phase configuration:	DC
Rated Voltage :	24.0 VDC
Output Power	40 W
Rated current :	2.8A ± 10%
Horse power (HP):	0.268 HP
Rated Torque :	0.708 N.m

Rating – Tracker control Box	
Input configuration:	Single-Phase
Input range:	90 Vac to 264 Vac
Input frequency:	50/60Hz
Output range:	24 Vdc
Output current:	10A
Output frequency:	DC

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### 1.3 Evaluation summary

- a) That as the attachment of these systems to a building must be evaluated “on-site,” based on system size and local building code requirements, this Listing does not attempt to provide certification of suitability with respect to building attachment.
- b) That suitability of ballasting or other means of attachment must be determined on-site by a Qualified Authority having Jurisdiction over the installation.
- c) Secure all wiring within one foot of dampers using a UL-Listed wire positioning device. Wiring must be permanently constrained to prevent any interference with dampers. Wires can bind and short circuit, potentially causing damage to the system, personal injury and/or death.
- d) All wiring of different circuits must be routed separately, and bundled or otherwise controlled with separation maintained between wiring of different circuits, unless all wiring of both circuits is rated for the voltage of the highest circuit involved.

## 2 Summary

### Parts for 2X45 Configuration:

Reference	Description	Quantity / Tracker
SRM-AS-06-000	Lower bushing bracket	6
SRM-AS-00-006	Bushing	12
SRM-AS-00-014	Upper bushing bracket	6
SRM-AS-00-007	Simple pile C-bracket	6
SRM-AS-00-017	Bushing lateral stop	24
SRM-AS-00-009	Simple pile C-bracket spacer	-
SF7-AM-90-000	Slewing Drive Mounting Bracket Welded Assy. -2	1
SF7-AM-93-000	Slewing Drive Mounting Bracket Welded Assy.	1
Motor DC 40W 90°	DC Planet Gear Motor 40W 90 Degrees	1
VE9I-61-25-2230	VE9I-61-25-2230 Slewing Drive	1
SRM-HI-00-051	Motor pile W8x15	1
SRM-HI-00-046	Simple pile W8x10	6
SRM-ER-06-001	Section coupler	4
SRM-RE-00-004	Torque splice block 150x4	2
SRM-RE-00-024	Section splice block 150x4 150x3	2
SRM-SM-00-022	Module support x 2 omega profile, drills JKM315PP-72, 100mm.	46
SRM-SM-00-030	Upper module support reinforcement	46
SRM-SM-00-029	Module support reinforcement	46
SRM-SM-00-013	U-bolt M10	58
SRM-EL-14-000	Head Tracker controller	1
10k5-SP-02-001	U-bolt M8	2
SF7-ER-00-013	Torque tube 150x150x4 10.86 m	2
SRM-ER-16-002	Torque tube 150x150x3 11.6 m	2
SRM-TT-07-000	Grounding connection plug Ø 13-24	2
SRM-ER-00-038	End cap	2

### Fasteners Detailed Breakdown for 2x45 Configuration:

Metric	Description	Quantity / Tracker
<b>M8</b>	Flat washer M8, DIN 125	4
	Hex nut M8, DIN 985	4
<b>M10</b>	Flat washer M10, DIN 125	118
	Hex nut M10, DIN 985	118
<b>M12</b>	Hex bolt M12x45, DIN 933, <b>8.8</b>	40
	Hex bolt M12x50, DIN 933, <b>10.9</b>	12
	Flat washer M12, DIN 125	80
	Spacing flat washer M12, DIN 7349	24
	Lock washer M12, DIN 127	36
	Hex nut M12, DIN 934, <b>8</b>	24
	Hex nut M12, DIN 934, <b>10</b>	12
<b>M16</b>	Hex bolt M16x40, DIN 933, <b>10.9</b>	16
	Hex bolt M16x50, DIN 933, <b>8.8</b>	12
	Spacing flat washer M16, DIN 7349	16
	Lock washer M16, DIN 127	28
	Flat washer M16, DIN 125	24
	Hex nut M16, DIN 934, <b>8</b>	12
<b>M20</b>	Hex bolt M20x80, DIN 933, <b>8.8</b>	12
	Structure flat washer M20, DIN 7989	24
	Lock washer M20, DIN 127	12
	Hex nut M20, DIN 934, <b>10</b>	12
<b>Miscellaneous</b>	Self-drilling screw M5,5 x 19 DIN 7504	4

## 2.1 Tightening torques

Tightening torque of all elements of the structure must be sufficient to ensure a joint fixation. An excessive torque can compromise or damage the elements involved in the union.

It should be considered that these torques are not a structural requirement from the resistant point of view because no high strength joints are considered.

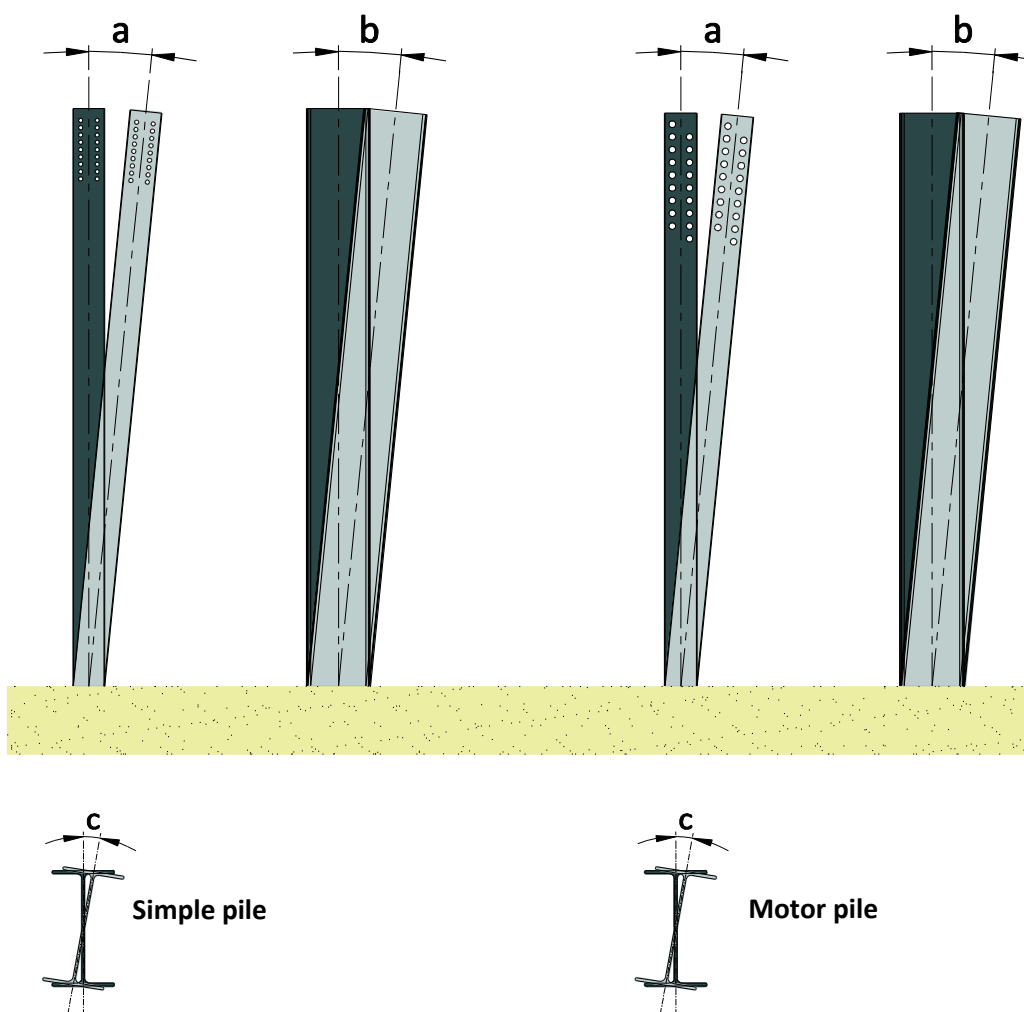
The values shown are recommendations for guidance only and are not subject to verification.



### 3 Foundation

#### 3.1 Parts and vertical installation

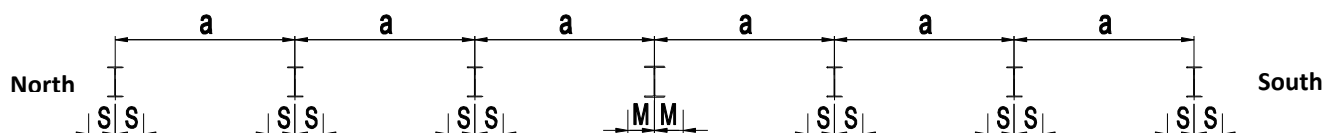
Description	Profile	Quantity
Motor pile	W8x15	1
Simple pile	W8x10	6



**Vertical Installation Tolerance**

Dimension	Simple Pile (degrees)	Motor Pile (degrees)
a	± 2	± 2
b	± 2	± 2
c	± 15	± 4

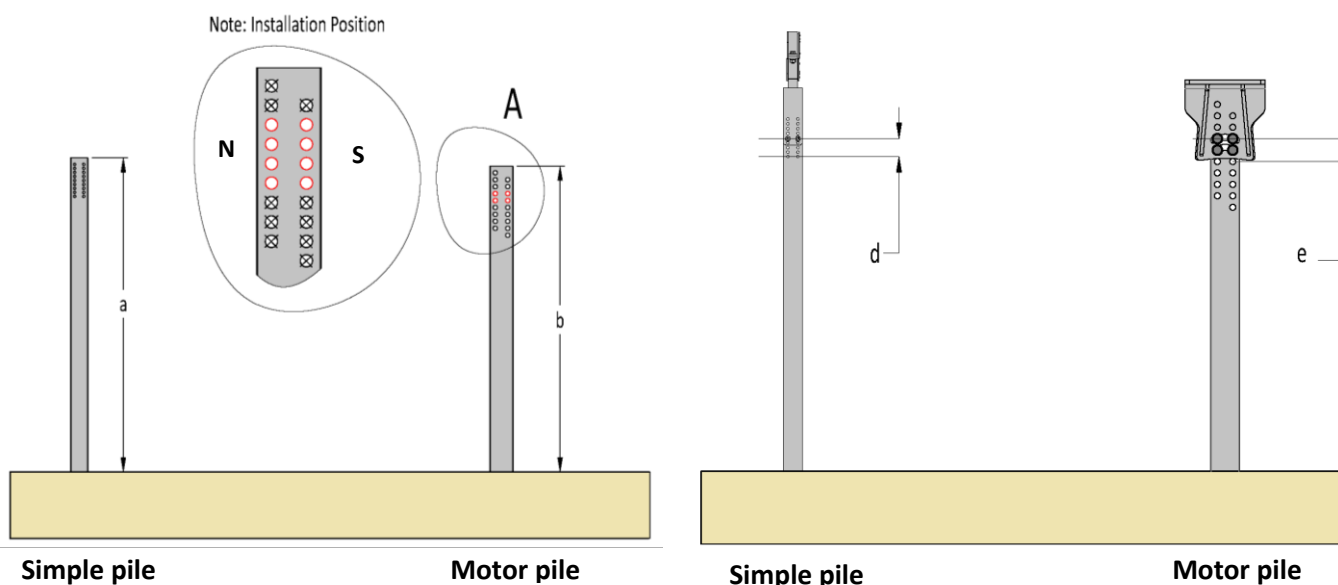
### 3.2 Horizontal Pile Spacing and Tolerance



Dimension	SI Metric (mm)	US Decimal (inch)
a	7000	236.22
S*	± 100	± 3.93
M*	± 50	± 1.96

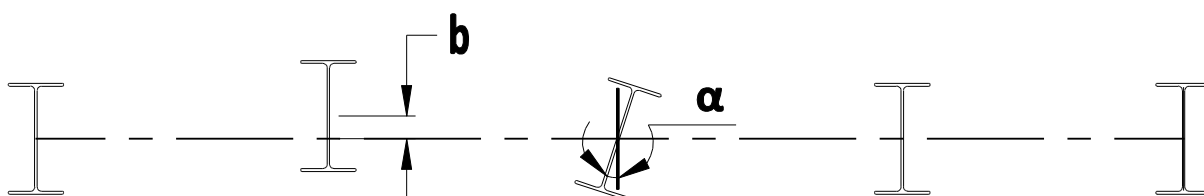
\*Allowed tolerance with regard to the theoretical parameters a

### 3.3 Finished Height and Row Alignment



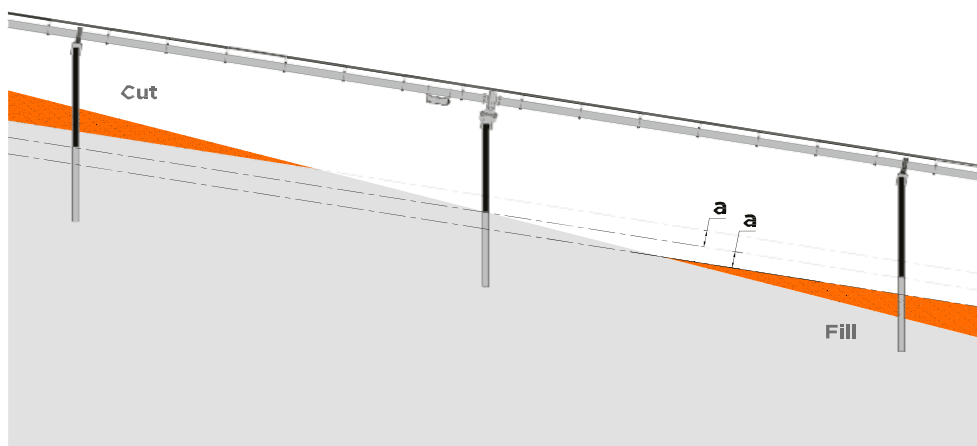
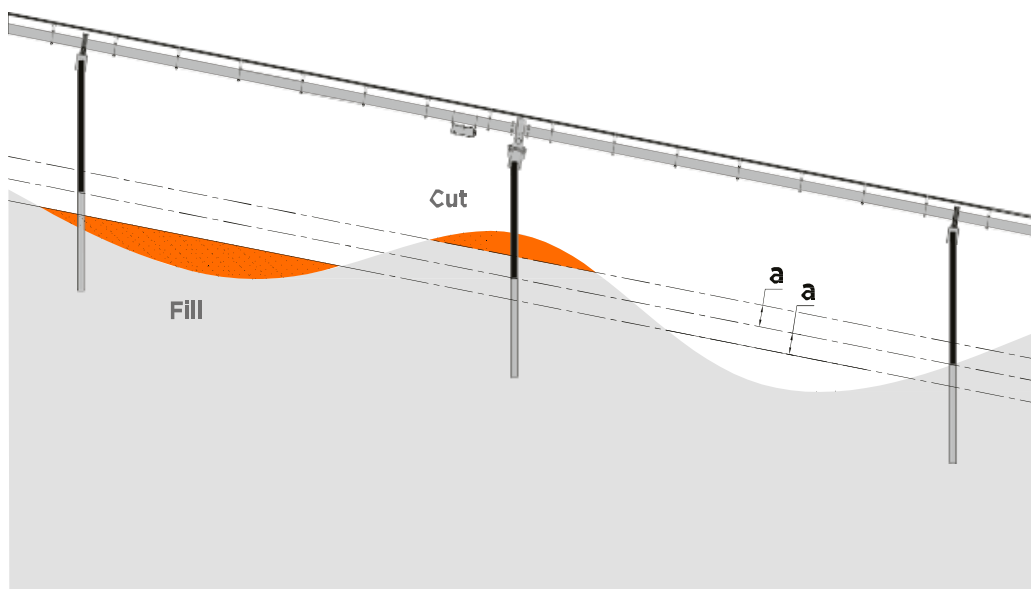
Dimension	SI Metric (mm)	US Decimal (inch)
a	1816 ± 92	71.49 ± 3.62
b	1786 ± 80	70.94 ± 3.15
d	± 92	± 3.62
e	± 40	± 1.57

### Finish Row Alignment



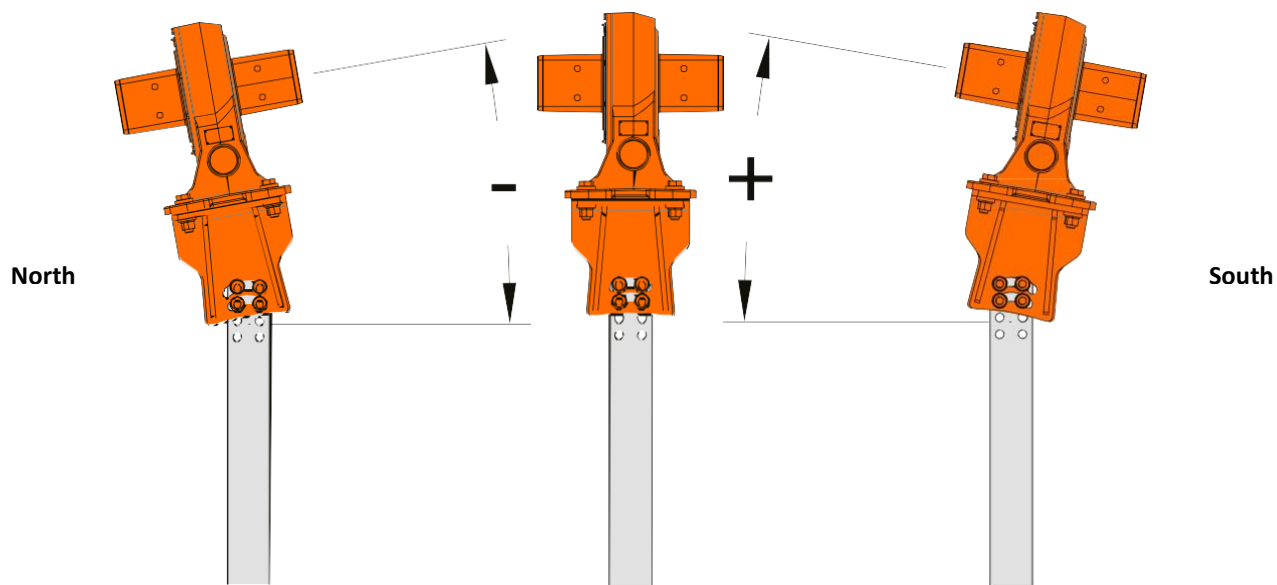
Dimension	SI Metric (mm)	US Decimal (inch)	NS Gradient (%)	NS Gradient (degrees)
b (simple pile)	± 48	±1.88	-	-
b (motor pile)	± 40	±1.57	-	-
α (simple pile)	-		± 26.8	± 15
α (motor pile)	-		± 7	± 4

### 3.4 Irregular Surface Installation



Dimension	SI Metric (mm)	US Decimal (inch)
a	± 200mm	± 7.87

### 3.5 Slope Installation



Dimension	NS Gradient (%)	NS Gradient (degrees)
Positive slope (+)	17	10
Negative slope (-)	17	10

## 4 Mounting Brackets

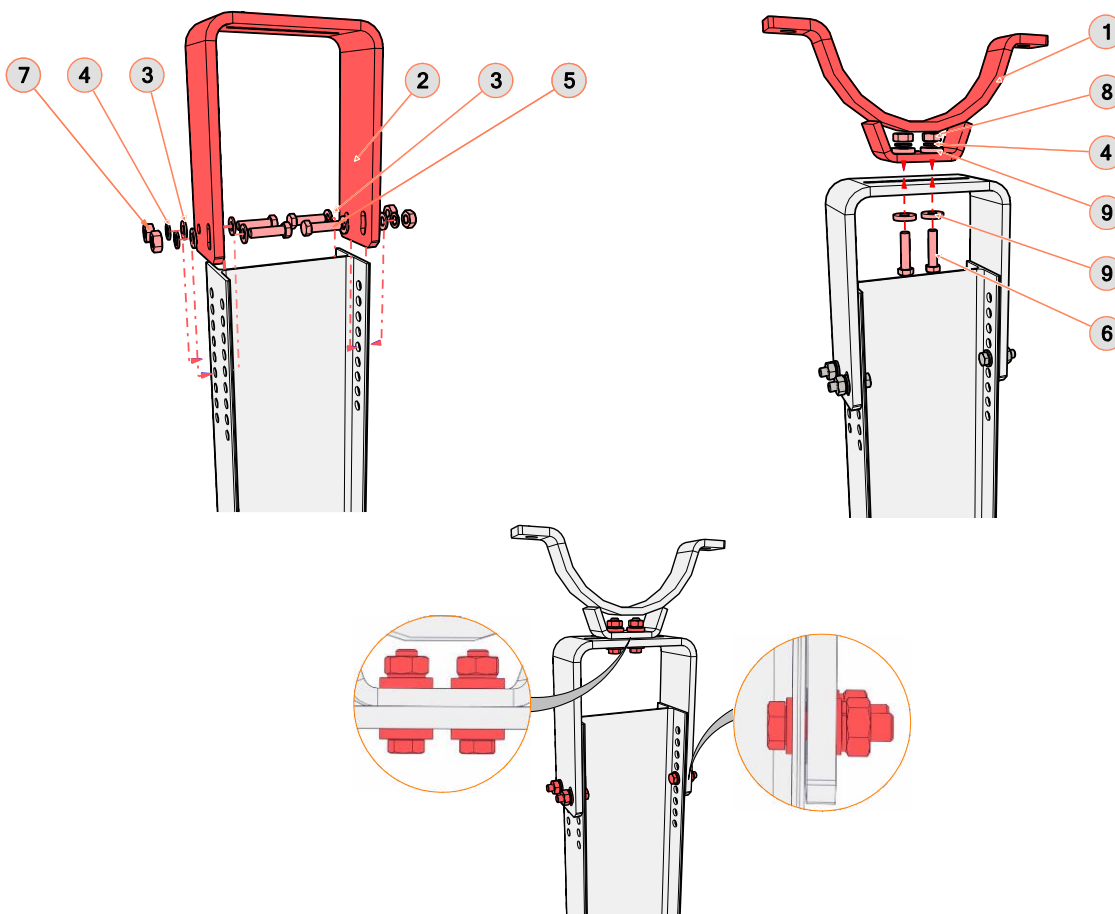
### 4.1 Simple Pile Bracket Assembly

#### Simple pile bracket assembly parts

Item	Reference	Description	Quantity
1	SRM-AS-06-000	Lower bushing bracket	1
2	SRM-AS-00-014	Simple pile C-bracket	1

#### Simple pile bracket fasteners and torque specs

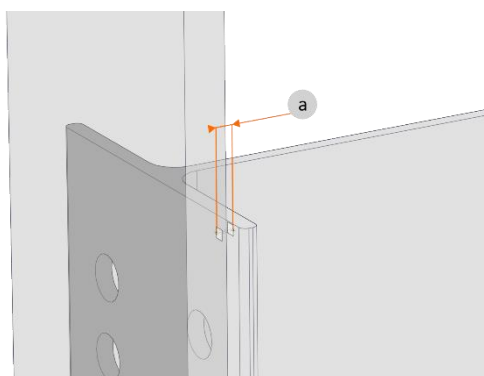
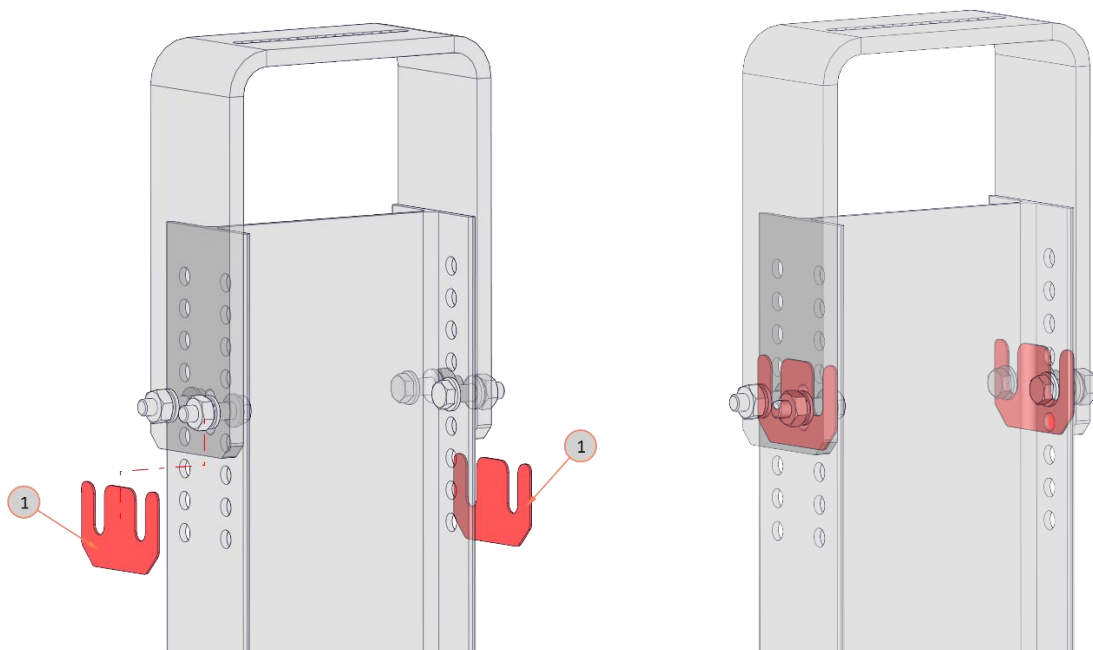
Item	Metric	Description	Quantity	Torque (Nm   ft-lb)
3	<b>M12</b>	Flat washer M12, DIN 125	8	40   30
4		Lock washer M12, DIN 127	6	
5		Hex bolt M12 x 45, DIN 933, <b>8.8</b>	4	
6		Hex bolt M12 x 50, DIN 933, <b>10.9</b>	2	
7		Hex nut M12, DIN 934, <b>8</b>	4	
8		Hex nut M12, DIN 934, <b>10</b>	2	
9		Spacing flat washer M12, DIN 7349	4	



#### 4.1.1 Simple pile C-bracket spacer installation

Item	Reference	Description	Quantity
1	SRM-AS-00-009	Simple pile C-bracket spacer	0, 1 or 2 ( * )

**\* See note**



**(\*)NOTE:**

This item will not always be required to install.

Quantity to install will be determined by dimension a. See the next table:

Dimension	SI Metric (mm)	Quantity
<b>a</b>	0 - 2	0
	3 - 4	1
	4 - 6	2

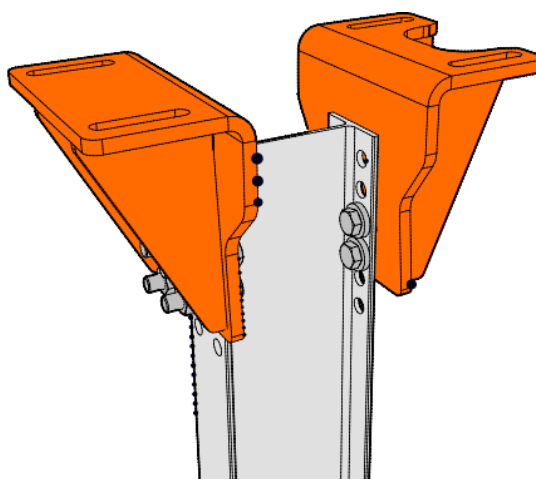
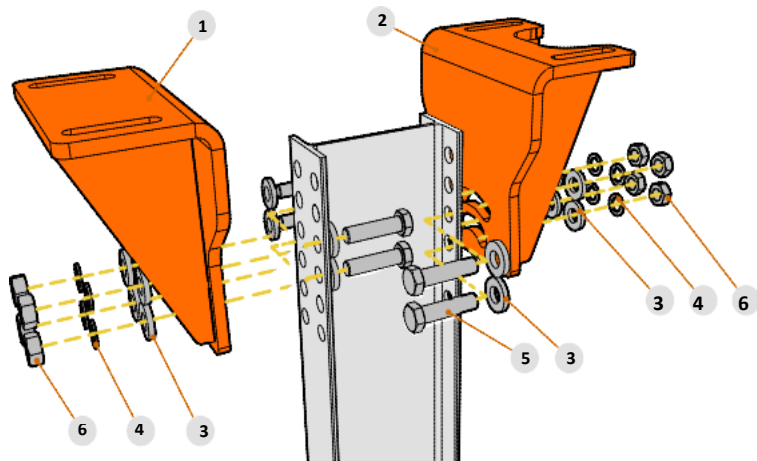
## 4.2 Motor Pile Bracket Assembly

### Motor pile bracket assembly parts

Item	Reference	Description	Quantity
1	SF7-AM-90-000	Slewing Drive Mounting Bracket Welded Assy. -2	1
2	SF7-AM-93-000	Slewing Drive Mounting Bracket Welded Assy.	1

### Motor pile bracket fasteners and torque specs

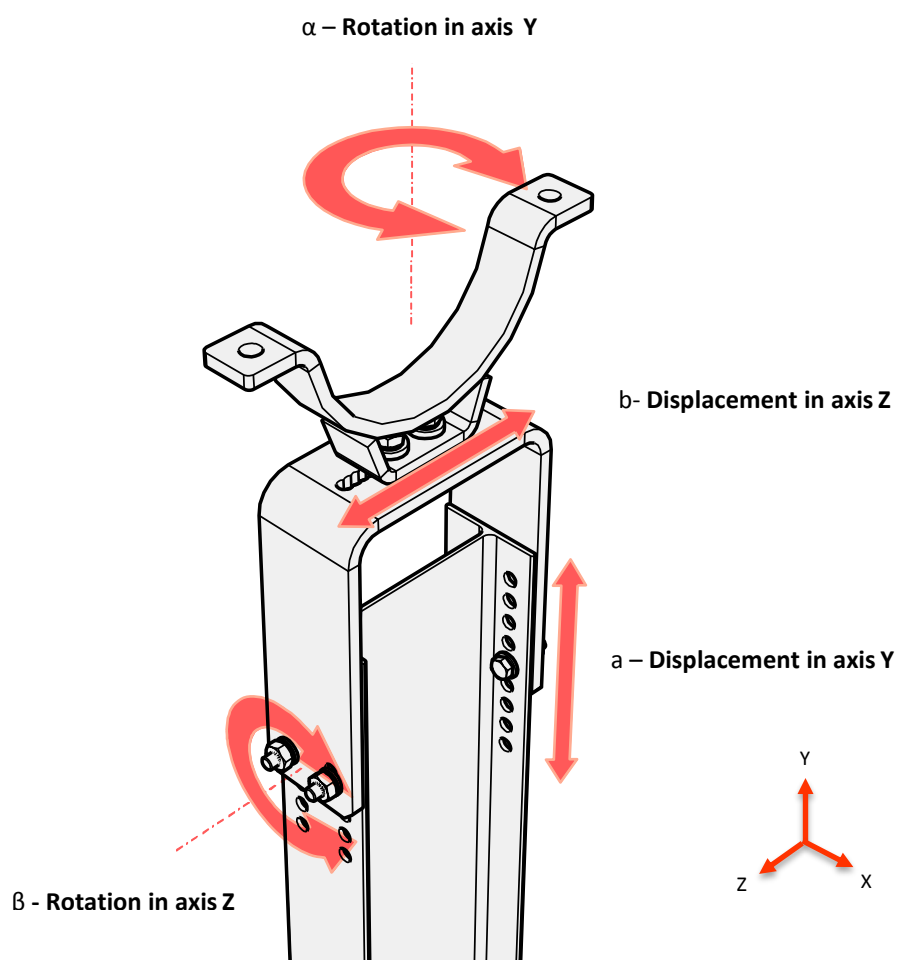
Item	Metric	Description	Quantity	Torque (Nm   ft-lb)
3	<b>M20</b>	Structure flat washer M20, DIN 7989	16	50   37
4		Lock washer M20, DIN 127	8	
5		Hex bolt M20x80, DIN 933, 8.8	8	
6		Hex nut M20, DIN 934, 10	8	





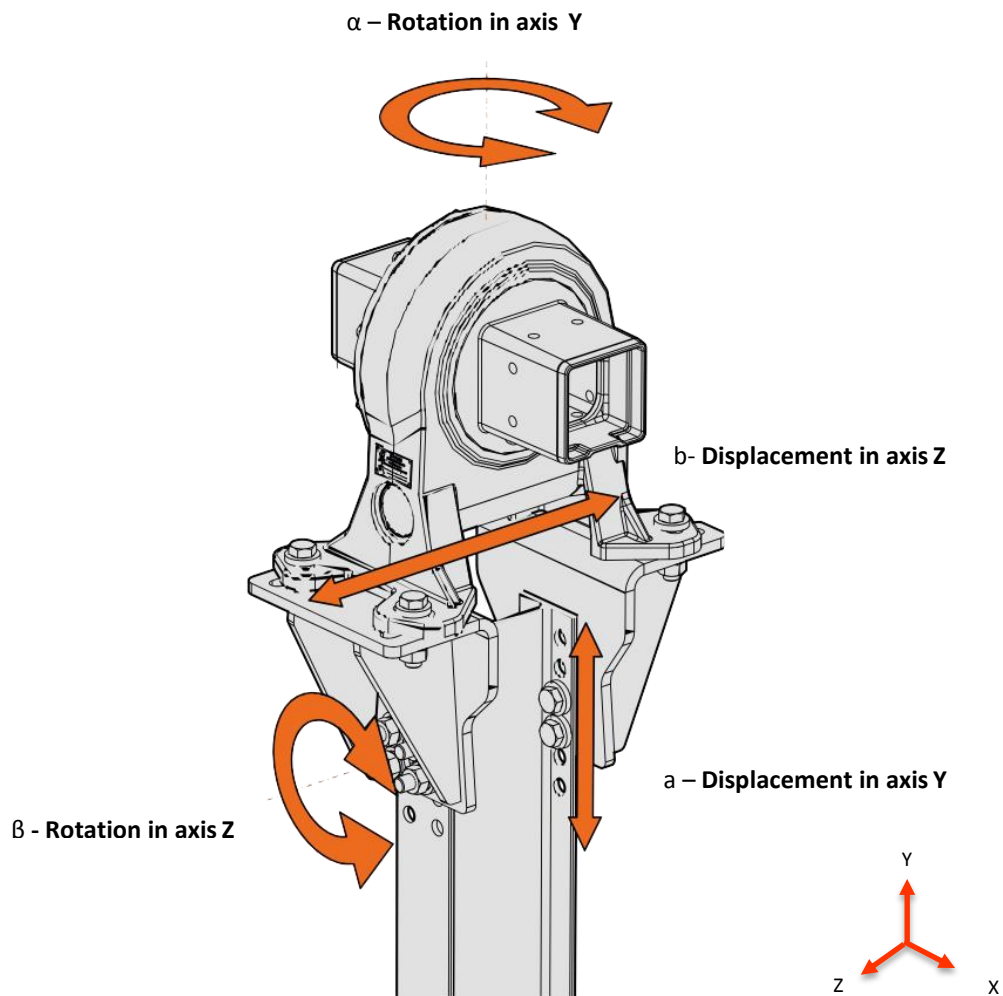
### 4.3 Finished Bracket Alignment Tolerance

#### 4.3.1 Simple Pile



Label	SI Metric (mm)	US Decimal (inch)	NS Gradient (%)	NS Gradient (degrees)
a	± 92	± 3.62"	-	-
b	± 48	± 1.89"	-	-
$\alpha$	-	-	± 26.7	± 15
$\beta$	-	-	± 17	± 10

#### 4.3.2 Motor pile



Label	SI Metric (mm)	US Decimal (inch)	NS Gradient (%)	NS Gradient (degrees)
a	± 40	± 1.57"	-	-
b	± 40	± 1.57"	-	-
$\alpha$	-	-	± 7	± 4
$\beta$	-	-	± 17	± 10

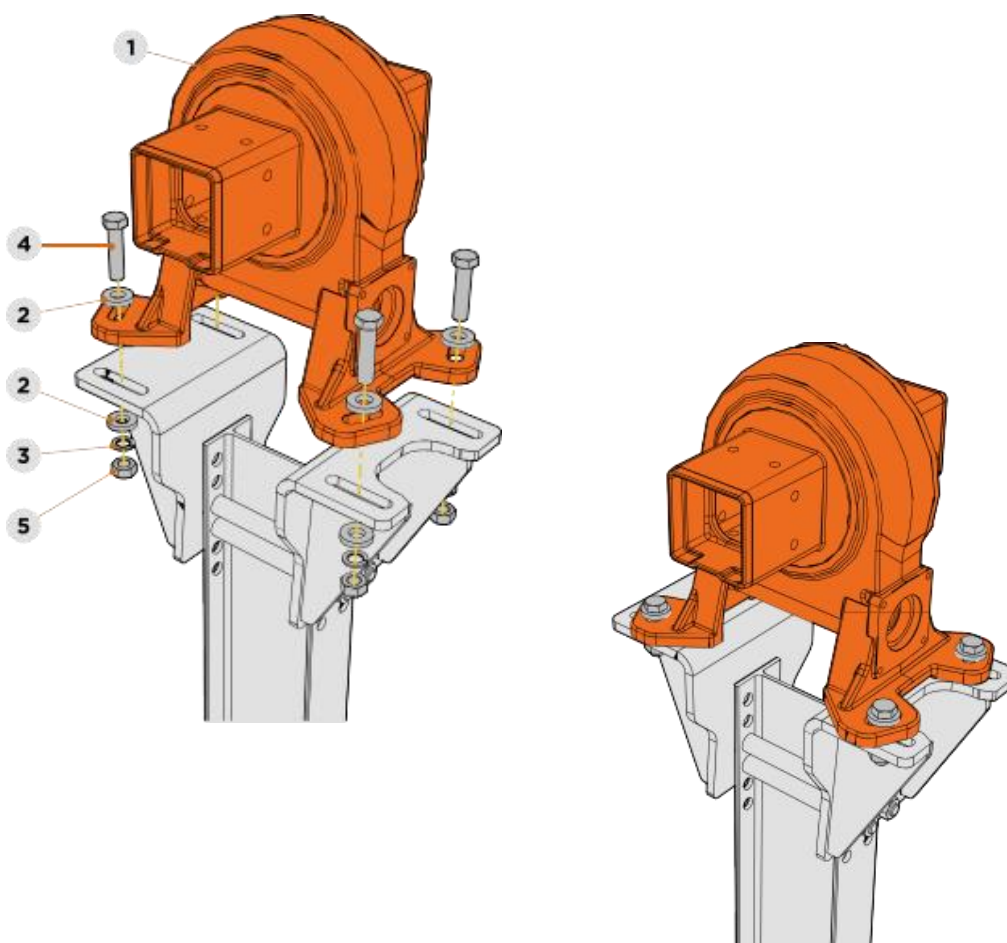
## 5 Drive System

### 5.1 Slewing Drive Installation

Item	Reference	Description	Quantity
1	VE9I-61-25-2230	VE9I-61-25-2230 Slewing Drive	1

#### Motor pile bracket fasteners and torque specs

Item	Metric	Description	Quantity	Torque (Nm   ft-lb)
3	<b>M20</b>	Structure flat washer M20, DIN 7989	8	50   37
4		Lock washer M20, DIN 127	4	
5		Hex bolt M20x80, DIN 933, 8.8	4	
6		Hex nut M20, DIN 934, 10	4	



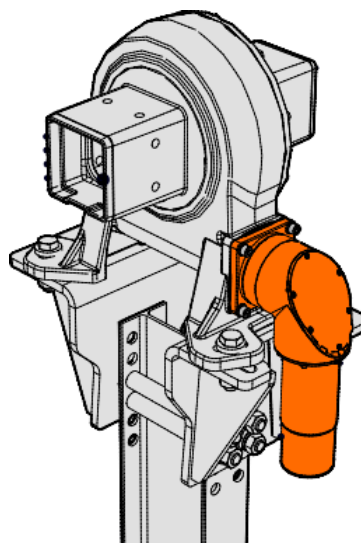
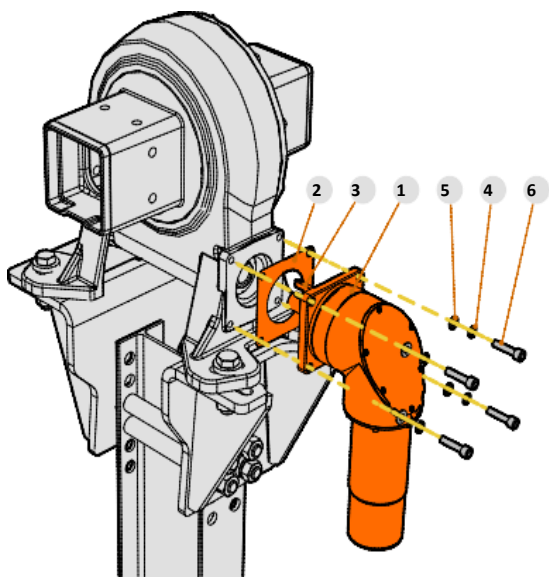
## 5.2 DC Motor Assembly

### DC motor assembly parts

Item	Reference	Description	Quantity
1	Motor DC 40W 90°	DC Planet Gear Motor40 w 90 Degrees	1
2	-	Motor mounting gasket	1
3	-	Shaft Key	1

### DC motor assembly fasteners and torque specs

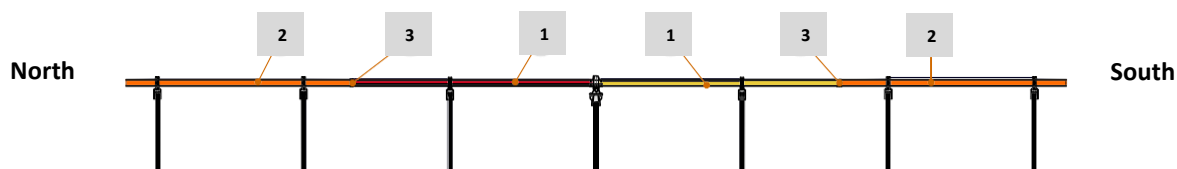
Item	Metric	Description	Quantity	Torque (Nm   ft-lb)
4	M10	Flat washer M10, DIN 125	4	10   7
5		Lock washer M10, DIN 127	4	
6		Bolt M10 x 40, DIN 912, <b>12.9</b>	4	



## 6 Torque Tube

The rotation axis are:

Item	Reference	Description	Quantity	SI Metric (mm)	US Decimal (inch)
1	SF7-ER-00-013	Torque tube	2	150x150x4, 10860	5.9x5.9x0.157, 427.5
2	SRM-ER-16-002	Torque tube	2	150x150x3, 11600	5.9x5.9x0.12, 456.7
3	SRM-ER-06-000	Section coupler	2	-	-



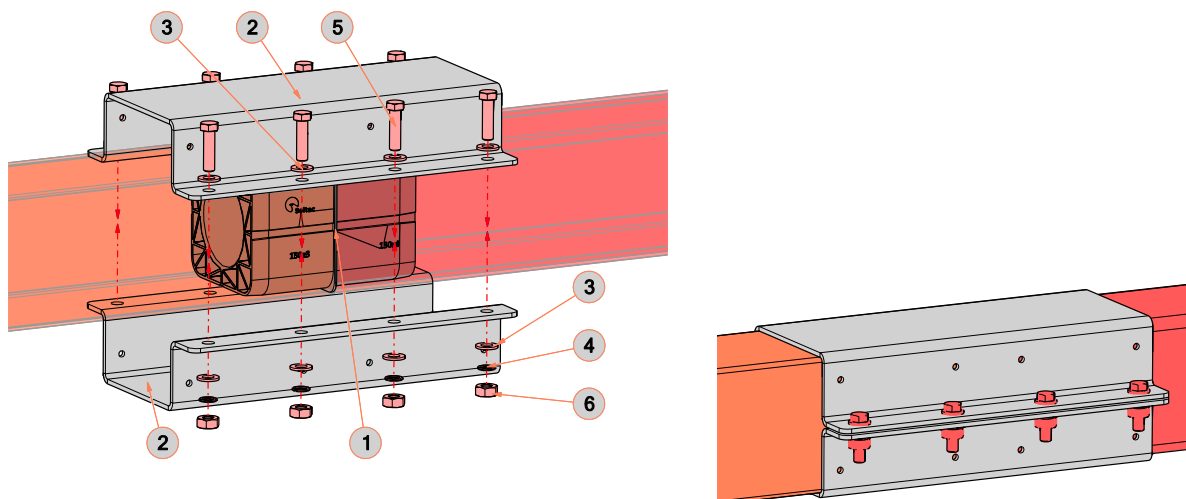
### 6.1 Section Coupler Assembly

Section coupler parts assembly

Item	Reference	Description	Quantity
1	SRM-RE-00-024	Section splice block 150x4 to 150x3	1
2	SRM-ER-06-001	Section coupler plate	2

Section coupler fasteners and torque specs

Item	Metric	Description	Quantity	Torque (Nm   ft-lb)
3	M12	Flat washer M12, DIN 125	16	40   30
4		Lock washer M12, DIN 127	8	
5		Hex bolt M12 x 45, DIN 933, <b>8.8</b>	8	
6		Hex nut M12, DIN 934, <b>10</b>	8	



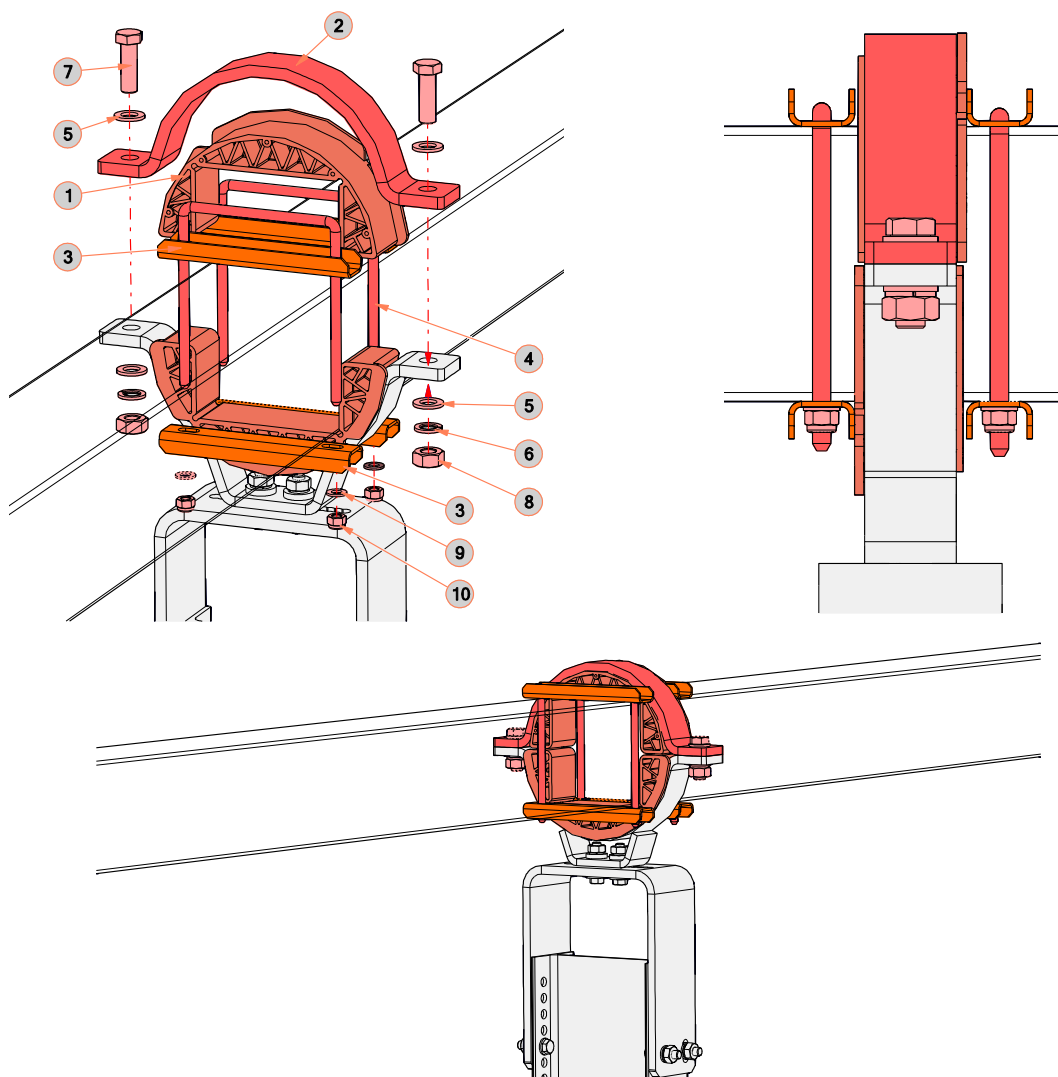
## 6.2 Bushing Installation Simple Pile

### Bushing Installation parts assembly

Item	Reference	Description	Quantity
1	SRM-AS-00-006	Bushing	2
2	SRM-AS-00-014	Upper bushing bracket	1
3	SRM-AS-00-017	Bushing lateral stop	4
4	SRM-SM-00-013	U-bolt M10	2

### Bushing Installation fasteners and torque specs

Item	Metric	Description	Quantity	Torque (Nm   ft-lb)
5	M16	Flat washer M16, DIN 125	4	30   22
6		Lock washer M16, DIN 127	2	
7		Hex bolt M16x50, DIN 933, 8.8	2	
8		Hex nut M16, DIN 934, 8	2	
9	M10	Flat washer M10, DIN 125	4	20   15
10		Hex nut M10, DIN 985	4	



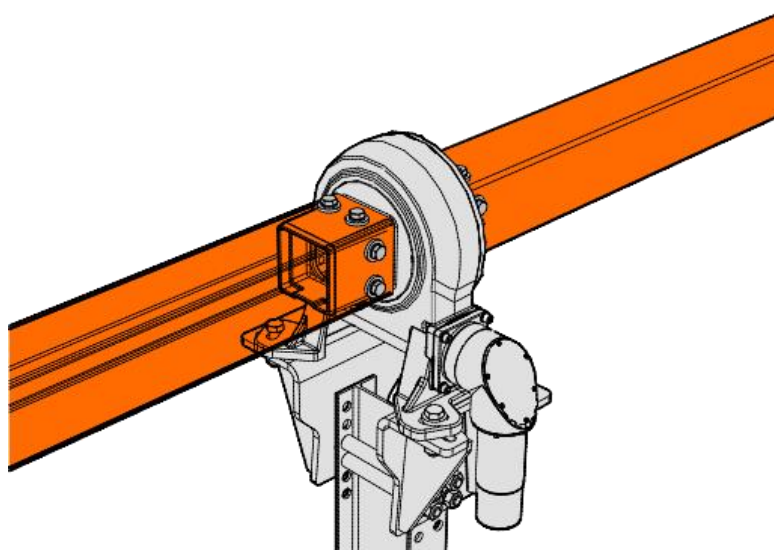
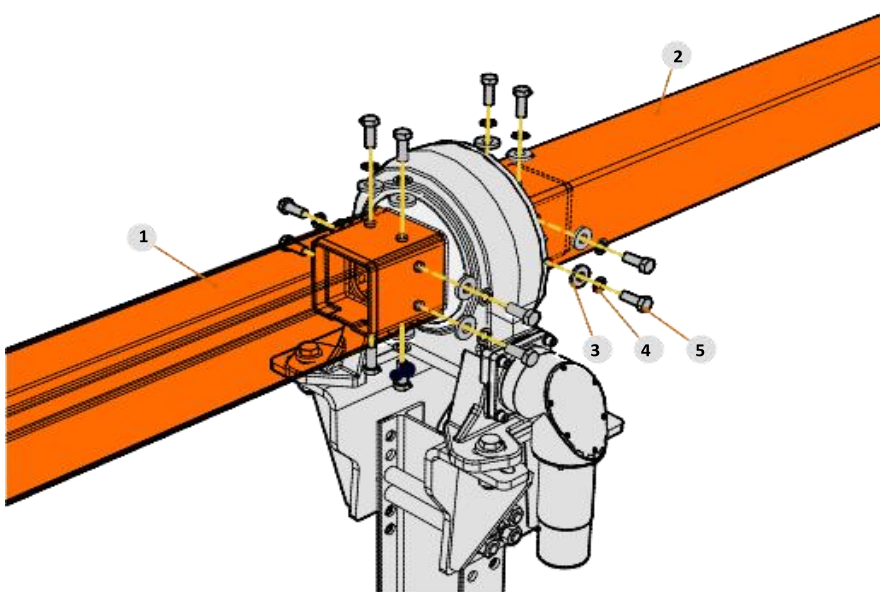
### 6.3 Torque Coupler Assembly

#### Torque coupler parts assembly

Item	Reference	Description	Quantity
1	SF7-ER-00-013	Torque tube	2

#### Torque coupler fasteners and torque specs

Item	Metric	Description	Quantity	Torque (Nm   ft-lb)
2	M16	Flat washer M16, DIN 7349	16	50   30
3		Lock washer M16, DIN 127	16	
4		Hex bolt M16x40, DIN 933, 10.9	16	



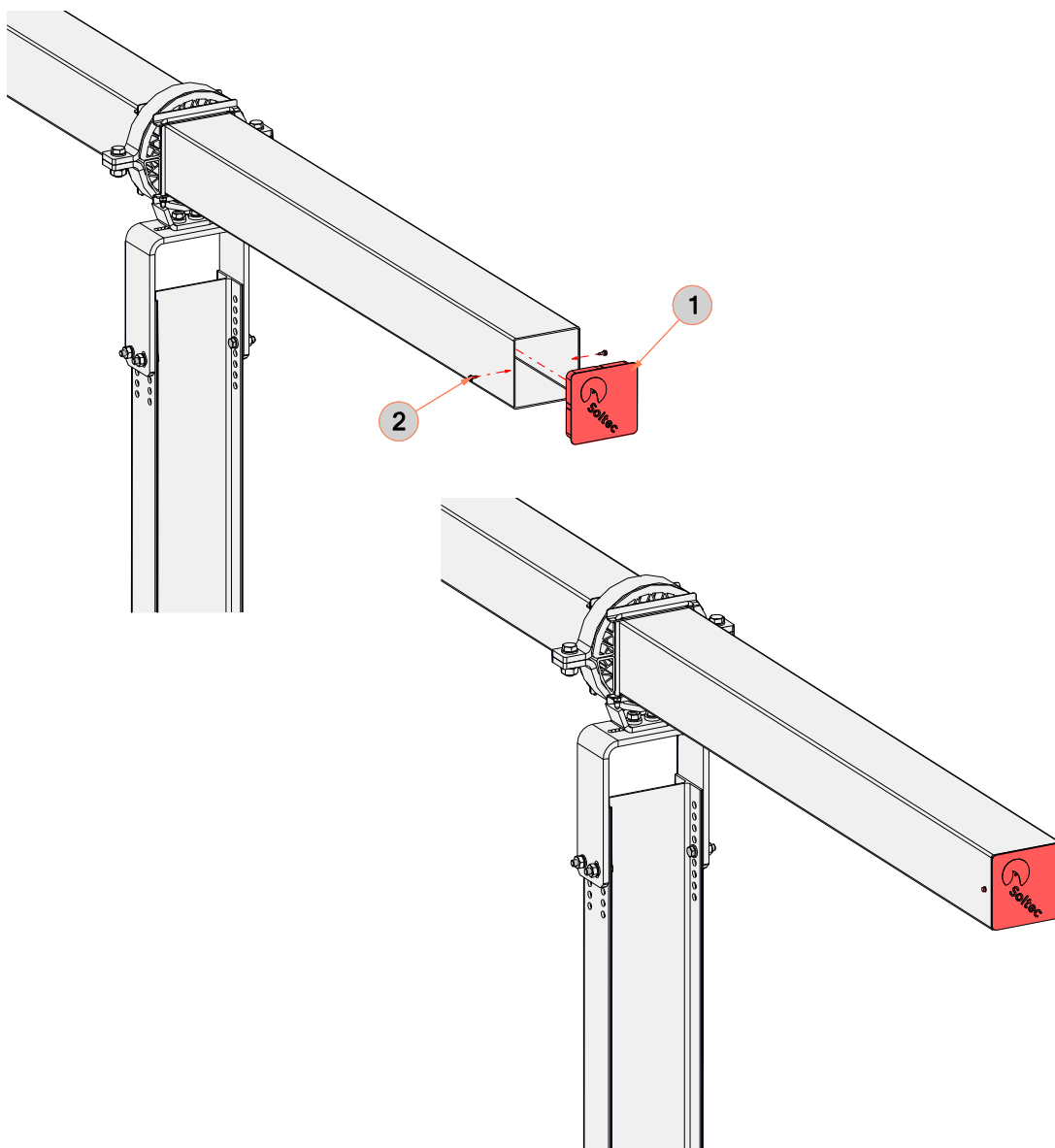
## 6.4 End Cap Installation

### End cap installation parts

Item	Reference	Description	Quantity
1	SRM-ER-00-038	End cap	1

### End cap installation fasteners and torque specs

Item	Metric	Description	Quantity	Torque (Nm   ft-lb)
2	M5.5	Self-drilling screw M5,5x19 DIN 7504	2	5   4





## 7 PV Mounting System

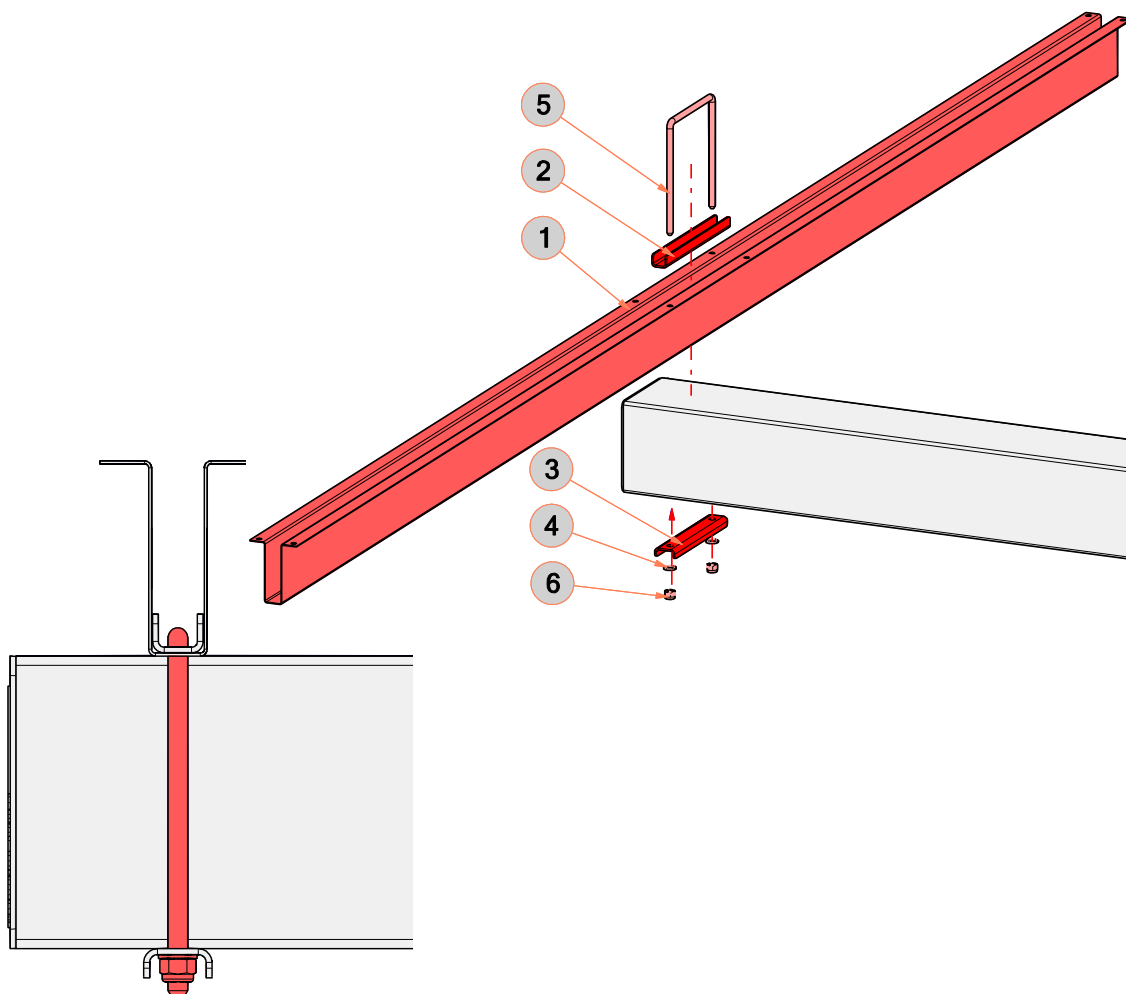
### 7.1 PV Mounting Rail Installation

#### PV mounting rail assembly parts

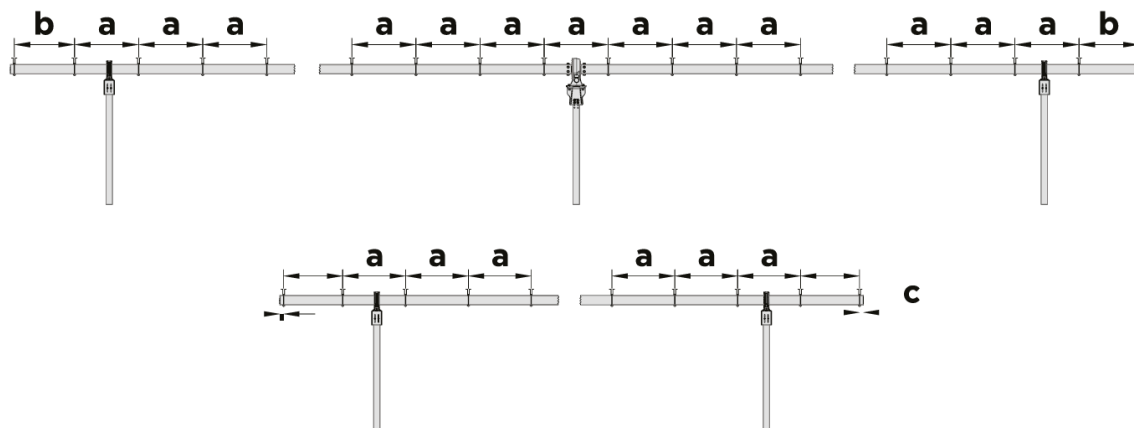
Item	Reference	Description	Quantity
1	SRM-SM-00-022	Module support x 2 omega profile, drills JKM315PP-72, 100mm.	1
2	SRM-SM-00-030	Upper module support reinforcement	1
3	SRM-SM-00-029	Module support reinforcement	1

#### PV mounting rail assembly fasteners and torque specs

Item	Metric	Description	Quantity	Torque (Nm   ft-lb)
4	M10	Flat washer M10, DIN 125	2	20   15
5		U bolt M10	1	
6		Hex nut M10, DIN 985	2	



## 7.2 PV Mounting Rail Horizontal spacing



Dimension	SI Metric (mm)	US Decimal (inch)
a	1002	39.44
b	942	37.09
c	37	1.45

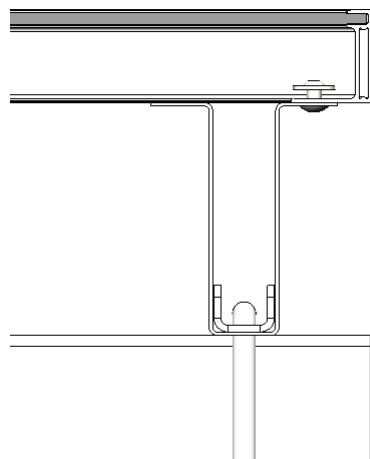
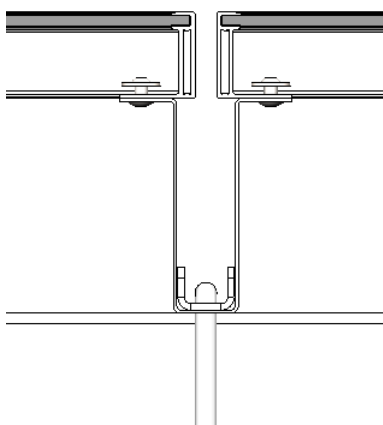
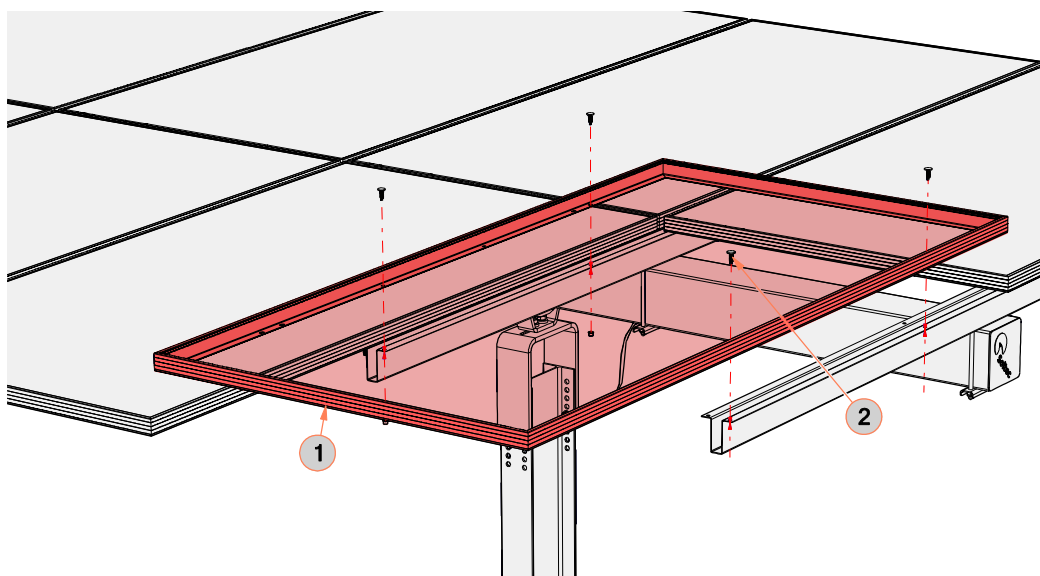
### 7.3 PV Module Installation

#### PV mounting parts

Item	Description	Quantity
1	Pv Module	1

#### PV mounting installation fasteners

Item	Description	Quantity
2	Monobolt Rivet 2771 6.4	4



## 8 Control and communication

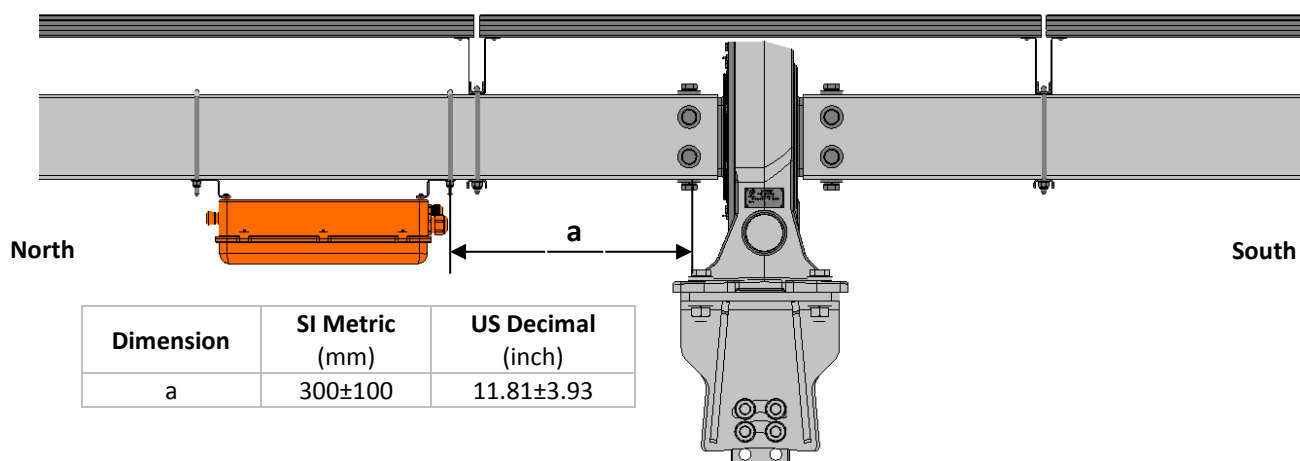
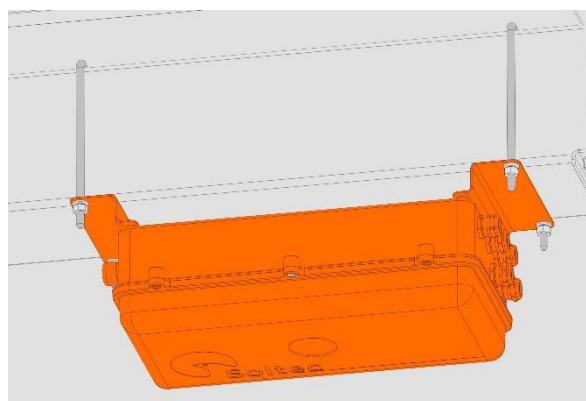
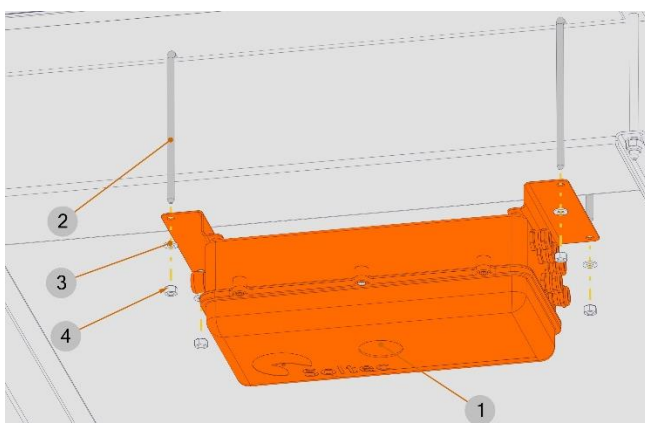
### 8.1 Tracker controller and installation parts

Item	Reference	Description	Quantity
1*	SRM-EL-14-000	Head -Tracker controller	1
1*	SRM-EL-15-000	Sub-Tracker controller	1
2	10K5-SP-02-001	U-bolt M8	2

\*This ítem will be installed according to layout distribution.

#### Tracker controller fasteners and torque specs

Item	Metric	Description	Quantity	Torque (Nm   ft-lb)
3	M8	Flat washer M8, DIN 125	4	20   15
4		Hex nut M8, DIN 985	4	



## 9 Grounding Installation

### Grounding installation parts

Item	Reference	Description	Quantity
1	SRM-TT-07-000	Grounding connection plug Ø 13-24	2

