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# Change management history

<table>
<thead>
<tr>
<th>No</th>
<th>Date</th>
<th>Chapter</th>
<th>Description</th>
<th>Author</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>07th August 2020</td>
<td>All</td>
<td>Writing</td>
<td>G. Dambrine</td>
</tr>
</tbody>
</table>

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1 Preface

1.1 General Information

This installation manual is provided for installers and operators of HeliosLite HLPV12 axis systems that
are designed and commercialized by HeliosLite. This manual contains important electrical and
mechanical safety instructions for operators who must follow the instructions given in this manual.

Please read this manual carefully before installing or maintaining HeliosLite HLPV12 tracker systems.

The orientation of the tracker given in this manual correspond to an installation of the system at a site
located in the Northern hemisphere. For an installation in the Southern hemisphere, the orientation
of the tracker should be inverted.

The information contained in this manual may be revised, updated and supplemented at any time by
HeliosLite without prior notice to any third party. Authorized users who previously received this
manual may request current version of this manual by making a request to HeliosLite.

1.2 Liability

All the information described in this manual is the intellectual property of HeliosLite and this manual
does not constitute any warranty, expressed or implied.

HeliosLite HLPV 1.5 axis systems must be installed by professional installers which have been trained
by HeliosLite otherwise HeliosLite will not assume any responsibility and expressly disclaims liability
for loss, damage, or expense arising out of or in any way connected with installation, operation, use or
maintenance of the HeliosLite HLPV 1.5 axis systems.
2 Conventions Used

This manual uses the following hierarchy of danger, warning and caution notices, and notes to convey safety and noteworthy information.

Danger Notices

DANGER

Dangers indicate a hazardous situation which, if not avoided, will result in death or serious injury.

Warning Notices

WARNING

Warnings indicate hazardous situation which, if not avoided, could result in death or serious injury.

Caution Notices

CAUTION

Cautions indicate a hazardous situation which, if not avoided, could result in minor or moderate injury.

Notes

NOTE

Notes indicate items that are important to know about, but they are not as serious as danger, warning, or caution notices.
3 Important Safety Considerations

This section describes important safety instructions for HeliosLite systems. Make sure you read, follow and save these instructions. These instructions do not intend to cover every safety eventuality and do not replace any local or site-specific safety procedures. There is a potential for death, injury and/or equipment damage when installing, commissioning, and maintaining HeliosLite systems.

3.1 Installation Requirement and Conditions of Use

Install this system and equipment according to the following requirements:

- **Do not install this equipment without proper training**

  **WARNING**

  Do not install, commission or troubleshoot HeliosLite System without proper training or relevant documentation conducted and provided by HeliosLite.

- **Exercise care around this equipment at all times**

  **WARNING**

  Use proper lifting techniques when handling relevant components. Use proper equipment to protect against bodily injury.

<table>
<thead>
<tr>
<th>Hard hat</th>
<th>Safety goggles</th>
<th>Appropriate shoes</th>
<th>Gloves</th>
</tr>
</thead>
</table>

- **Do not install this equipment alone in an isolated site**
4 HeliosLite HLPV tracker description

4.1 HLPV Tracker Technical Specifications

<table>
<thead>
<tr>
<th>Type</th>
<th>HLPV12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tracking type</td>
<td>1.5 axis variable tilt and roll tracker for PV panels</td>
</tr>
<tr>
<td>Modules &amp; kWp per tracker</td>
<td>12x60 cells or 12x72 cells panels. kWp ranging from 3.0 to 4.1 kWp</td>
</tr>
<tr>
<td>Actuator protection class</td>
<td>IP 55</td>
</tr>
<tr>
<td>Tracking range</td>
<td>Tilt: +4 to +17°, Roll: -42° to +42°</td>
</tr>
<tr>
<td>Structure</td>
<td>Hot dip galvanized steel structure</td>
</tr>
<tr>
<td>Dimensions</td>
<td>Module frame H=6.0m, W=4.0m; Maximum system height &lt; 4.0m</td>
</tr>
<tr>
<td>Maximum wind speed</td>
<td>Up to 110 km/h (10 min average) &amp; 175 km/h (3s gust) measured at 10m</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>-30 °C / + 70 °C</td>
</tr>
<tr>
<td>Codes &amp; Standards</td>
<td>Eurocodes 1, IEC 62817, CE (in progress)</td>
</tr>
<tr>
<td>Warranty</td>
<td>10 years on structural components, 5 years on drive and control system</td>
</tr>
</tbody>
</table>

Figure 4-1 HLPV12 tracker main dimensions, back & side view in stow position
5 Mechanical installation

5.1 Mandatory tools required for mechanical tracker installation

Set of metric spanners
- Size 18/19 for M12 hexagonal bolts & Nylstop nuts
- Size 24 for M16 hexagonal bolts & Nylstop nuts

Racket wrench with metric sockets + electric impact wrench
- Size 13 for TDBL screws (Magnetic socket)
- Size 18/19 for M12 bolts
- Size 24 for M16 bolts

Torque wrench with preload table
- Minimum torque : 50 N.m
- Maximum torque ≥ 230 N.m

Battery tool for structural rivets – PB3400 (Stanley)

Hand grease gun

Circlip plier

Electric drill with drill bit Ø6.8mm

Bubble level

Table 1 Installation tools required for installation
6 Transport

Descriptions of unloading and transport of HeliosLite HLPV12 tracker are contained in this chapter. Dimensions and weights are given in the next section to help site manager.

WARNING

Site manager is responsible to the use of the right lifting equipment for unloading and transport on site.

6.1 Required equipment

No specific lifting equipment is required for lifting. Two (x2) workers can move & install the entire tracker.

Nevertheless, lifting equipment for unloading is required.

6.2 Dimensions and weights

Dimensions and weights are described in the table below for the main sub-assemblies & parts.

---

**East/West Beam Assembly for Tracker Base**
- Main dimension: 2.2m
- Weight: Approx. 13 kg

**North/South Beam Assembly for Tracker Base**
- Main dimension: 1.9m
- Weight: Approx. 14 kg

**Pole Structure - Tube**
- Main dimension: 1.8m
- Weight: Approx. 4 kg

**Actuator Mounting Support**
- Main dimension: 1.0m
- Weight: Approx. 14.5 kg

**Horizontal beam**
- Main dimension: 6.3m
- Weight: Approx. 39.6 kg

**Module Support Rail**
- Main dimension: 2.8m
- Weight: Approx. 5.8 kg
---
7 Setting up the chassis structure

Installation of the chassis structure is described in this chapter.

This structure supports the pole structure and PV Modules array. Foundations used for this chassis structure are site-specific and need to be checked by HeliosLite before installation. Several anchoring solutions have been qualified by HeliosLite and the most cost-effective solution can be down selected depending on local site soil condition.

NOTE
Always use grease on bolts to reduce friction coefficient during bolt tightening.

7.1 Material details

NOTE
On the following pictures, the tracker was mounted in the Northern hemisphere with an inclination towards the South.

East/West Beam Assembly for Tracker Base (x1)
Main dimension: 2.1m
Weight: Approx. 13 kg

North/South Beam Assembly for Tracker Base (x1)
Main dimension: 1.9m
Weight: Approx. 14 kg

7.2 East/West Beam Assembly

7.3 North/South Beam Assembly
7.4 Installation

1. Mount one (x1) East/West beam and one (x1) North/South beam

Hardware required:

<table>
<thead>
<tr>
<th>N°</th>
<th>Part Name</th>
<th>Material</th>
<th>Quantity</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>Hex. Head Bolt</td>
<td>Galvanised Steel 8.8 Grade</td>
<td>3</td>
<td>ISO4014 M12x80</td>
</tr>
<tr>
<td>11</td>
<td>Plain washer</td>
<td>Galvanised Steel 8.8 Grade</td>
<td>3</td>
<td>ISO M12</td>
</tr>
<tr>
<td>12</td>
<td>Hex. Nut Nylstop</td>
<td>ZN Nickel</td>
<td>3</td>
<td>ISO7040 M12</td>
</tr>
</tbody>
</table>

Assembly quantity per tracker: x1

10: Hexagonal bolt / ISO4014 M12x80
11: Plain washer / ISO M12.
12: Self locking nut / M12

Bolted connection (x3)

- Tighten bolts at the torque value specified bellow:

79 Nm
FASTENING TORQUE REQUIRED
2. Mount chassis structure to anchoring points 1 / 2 / 3 / 4.

Hardware required:

Specific to anchor solution used.

<table>
<thead>
<tr>
<th>NORTH</th>
<th>Assembly quantity per tracker: x1</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOUTH</td>
<td>Anchor connection (x4) points indicated by arrows.</td>
</tr>
<tr>
<td></td>
<td>For anchor position, the best is to use the chassis as pattern to locate anchor position with steel bar, remove the chassis and install anchor selected at each position.</td>
</tr>
</tbody>
</table>

Foundation block installation:

Use of fischer anchor RGM12 with chemical capsule RMII-12. Please follow Fischer instructions for installation.

Height above foundation block = 86mm
8 Steering arm assembly (Master tracker)
The steering arm is a mechanical assembly which is specific to the cinematic of the HeliosLite HLPV 1.5 axis tracker systems. The module support assembly is connected to the tracker upper steering arm.

**Definition:**

**Master tracker**: Tracker equipped with a linear actuator

**Slave tracker**: Tracker connected to Master tracker with a linkage rod. No linear actuator need to be installed on a Slave tracker.

![NOTE]

Always use grease on bolts to reduce friction coefficient during bolt tightening.

### 8.1 Material details

![NOTE]

On the following pictures, the tracker is mounted in the Northern hemisphere with an inclination towards South.

- **Lower Steering Arm with Coupling Support Assembly (x1)**
  - Main dimension: 1.2m
  - Weight: Approx. 8.2 kg

- **Welded Reinforcement Beam (x1)**
  - Main dimension: 1.4m
  - Weight: Approx. 3.2 kg

- **Coupling Ball + Support with nut (x1)**
  - Weight: 2.75 kg

- **Actuator Mounting Support (x1)**
  - Main dimension: 1.0m
  - Weight: Approx. 14.5 kg

- **Linear Actuator (x1)**
  - Main dimension: 1.4m
  - Weight: 12.5 kg
8.2 Installation

1. Connect lower steering arm & actuator mounting support to chassis structure to identify position of the 5th anchor for actuator support (orange arrow).

   **This actuator support can be installed on the East or West side of the chassis.**

   **Assembly quantity per tracker:**
   x1

   Anchor connection (x1) point indicated by arrows.

   For anchor position, the best is to use the actuator support temporary installed to locate anchor position with steel bar, remove the actuator support and install anchor.

   This operation is only required for “master” tracker unit (one actuator installed on tracker) but not for “slave” tracker.

   **CAUTION**

   With chemical anchors solution, use 3 anchors for this support

2. Installation of steering arm & actuator mounting support

   **Hardware required:**

<table>
<thead>
<tr>
<th>N°</th>
<th>Part Name</th>
<th>Material</th>
<th>Quantity</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>70</td>
<td>Hex. Head Bolt</td>
<td>Galvanised Steel 8.8 Grade</td>
<td>1</td>
<td>ISO4014 M16x60</td>
</tr>
<tr>
<td>16</td>
<td>Plain washer</td>
<td>Galvanised Steel 8.8 Grade</td>
<td>1</td>
<td>ISO M16</td>
</tr>
<tr>
<td>12</td>
<td>Hex. Nut Nylstop</td>
<td>ZN Nickel</td>
<td>1</td>
<td>ISO7040 M16</td>
</tr>
<tr>
<td>71</td>
<td>Screw Tensilock</td>
<td>ZN Nickel</td>
<td>2</td>
<td>ISO4017 M12x30</td>
</tr>
</tbody>
</table>
71: Screw Tensilock M12x30
61: Actuator mounting support

- Insert actuator mounting support on the north side of second pivot support
- Insert 2x screws Tensilock M12x30
- Tighten at the torque value specified below:

92 Nm
FASTENING TORQUE REQUIRED

Assembly quantity per tracker: x1

12: Self locking nut / M16
16: Plain washer / ISO M16
18: Lower Steering Arm
70: Hexagonal bolt / ISO4014 M16x60

- Insert bolt M16x60 with plain washer and nut opposite to its head

CAUTION

Only snug-tight the M16 nut to permit free rotation of the lower steering arm around the pivot point. This rotation is very important as required for the global tracker movement.
3. Insert hitch ball + support

**Assembly quantity per tracker:** x1

<table>
<thead>
<tr>
<th></th>
<th>Part Name</th>
<th>Material</th>
<th>Quantity</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>Hex. Nut Nylstop</td>
<td>ZN Nickel</td>
<td>1</td>
<td>ISO7040 M16</td>
</tr>
<tr>
<td>16</td>
<td>Plain washer</td>
<td>Galvanised Steel 8.8 Grade</td>
<td>1</td>
<td>ISO M16</td>
</tr>
<tr>
<td>70</td>
<td>Hex. Head Bolt</td>
<td>Galvanised Steel 8.8 Grade</td>
<td>1</td>
<td>ISO4014 M16x60</td>
</tr>
</tbody>
</table>

- Insert hitch ball
- Tighten nut M20 at the torque value specified below:

**200 Nm FASTENING TORQUE REQUIRED**

4. Install reinforcement beam between lower steering arm and chassis structure

**Hardware required:**

**Assembly quantity per tracker:** x1

<table>
<thead>
<tr>
<th></th>
<th>Part Name</th>
<th>Material</th>
<th>Quantity</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>Self locking nut / M16</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Plain washer / ISO M16</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>Welded reinforcement beam</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>70</td>
<td>Hexagonal bolt / ISO4014 M16x60</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Position welded reinforcement beam
- Insert bolt M16x60 with plain washer and nut opposite to its head

**CAUTION**

Only snug-tight the M16 nut to permit free rotation of the part around the pivot point. This rotation is very important as required for the global tracker movement.
Assembly quantity per tracker: x1

10: Hexagonal bolt / ISO4014 M12x80
11: Plain washer / ISO M12
12: Self locking nut / M12
17: Lower Steering Arm
22: Welded reinforcement beam
28: Hitch ball + support

- Insert hitch ball + support with welded reinforcement beam
- Insert bolts M12x80
- Place one (x1) plain washer and one (x1) self-locking nut at its end
- Tighten nut M12 at the torque value specified bellow:

79 Nm
FASTENING TORQUE REQUIRED

WARNING
Hitch ball needs to be oriented to the North (see picture on the left)

5. Assembly overview after installing steering arm and actuator mounting support

- Assembly overview at this stage
6. Linear actuator assembly

NOTE

Prior to actuator assembly, actuator needs to be sent in park position using the master controller. Please refer to the quick start guide for further information to proceed. Actuator range has been configured in factory prior to shipment by actuator manufacturer.

PROCEDURE:

FULL-REVERSE => ZERO => PARK

Hardware required:

<table>
<thead>
<tr>
<th>N°</th>
<th>Part Name</th>
<th>Material</th>
<th>Quantity</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>Hex. Nut Nylstop</td>
<td>ZN Nickel</td>
<td>2</td>
<td>ISO7040 M16</td>
</tr>
<tr>
<td>16</td>
<td>Plain washer</td>
<td>Galvanised Steel 8.8 Grade</td>
<td>8</td>
<td>ISO M16</td>
</tr>
<tr>
<td>67</td>
<td>Hex. Head Bolt</td>
<td>Galvanised Steel 8.8 Grade</td>
<td>1</td>
<td>ISO4014 M16x140</td>
</tr>
<tr>
<td>68</td>
<td>Hex. Head Bolt</td>
<td>Galvanised Steel 8.8 Grade</td>
<td>1</td>
<td>ISO4014 M16x120</td>
</tr>
</tbody>
</table>

12: Self locking nut / M16
16: Plain washer / ISO M16
65: Linear actuator mounting bracket
67: Hexagonal bolt / ISO4014 M16x140

- Install actuator mounting bracket first with (x1) hexagonal bolt (M16x140) with (1x) plain washer under head bolt, (4x) plain washer for spacer and (x1) plain washer under Nylstop nut

CAUTION

Only snug-tight the M16 nut.

12: Self locking nut / M16
16: Plain washer / ISO M16
66: Linear actuator
68: Hexagonal bolt / ISO4014 M16x120

- Connect actuator’s end rod to mounting support with one (x1) hexagonal bolt (M16x120)

CAUTION

Only snug-tight the M16 nut.
Assembly quantity per tracker: x1

It is important to respect the orientation of the linear actuator as described on the left. The actuator end rod needs to be attached onto the actuator mounting support.

Check that head bolts of the bracket are facing steering arm

Check verticality of the steering arm with bubble level.

Untighten 3 bolts on the actuator bracket if necessary to adjust verticality of the steering arm.

7. Assembly overview after installing actuator
9 Pole structure assembly

The pole structure is the assembly which supports the tracker main beam assembly which supports the array of PV modules. The pole structure is connected to the tracker chassis structure.

NOTE

Pole structure assembly can be done independently of tracker chassis structure assembly.

9.1 Material details

Pole Structure – Tube (x4)
Main dimension: 1.8m
Weight: Approx. 4 kg

Tube Linkage Connector (x4)
Main dimension: 0.15m
Weight: Approx. 1.6 kg

9.2 Installation

1. Insert four (x4) cast iron parts in four (x4) tubes D48.3 to mount pole structure assembly and insert bolt M12 for fixation.

NOTE

Respect cast iron part indexation in order to obtain the right orientation of the holes at the end of each tube.

Hardware required:

<table>
<thead>
<tr>
<th>N°</th>
<th>Part Name</th>
<th>Material</th>
<th>Quantity</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Hex. Head Bolt</td>
<td>Galvanised Steel 8.8 Grade</td>
<td>8</td>
<td>ISO4014 M12x80</td>
</tr>
<tr>
<td>4</td>
<td>Plain washer</td>
<td>Galvanised Steel 8.8 Grade</td>
<td>8</td>
<td>ISO M12</td>
</tr>
<tr>
<td>5</td>
<td>Hex. Nut Nylstop</td>
<td>ZN Nickel</td>
<td>8</td>
<td>ISO7040 M12</td>
</tr>
</tbody>
</table>
Assembly quantity per tracker: x1

**IMPORTANT NOTICE !**

Use tube Ø48.3 internal weld bead as reference to insert cast iron part.

- Chamfer on the cast iron part needs to be aligned with tube weld bead in order to obtain the right orientation of the tube end holes.
- Repeat this operation eight (x8) times to complete the assembly of the tracker pole structure.

- Red face of the cast iron part needs to be oriented to the external side of the pole structure assembly (orange arrows).

**Total weight = 23 KG**

3: Hexagonal bolt / ISO4014 M12x80
4: Plain washer / ISO M12.
5: Self locking nut / M12

**TEMPORARY FASTENING ONLY**

Bolted connection (x8)

Do not tighten the nuts at this stage in order to avoid extra stress during final tracker assembly.
2. Final assembly of the tracker chassis structure.

Hardware required:

<table>
<thead>
<tr>
<th>N°</th>
<th>Part Name</th>
<th>Material</th>
<th>Quantity</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>Hex. Head Bolt</td>
<td>Galvanised Steel 8.8 Grade</td>
<td>2</td>
<td>ISO4014 M16x90</td>
</tr>
<tr>
<td>16</td>
<td>Plain washer</td>
<td>Galvanised Steel 8.8 Grade</td>
<td>2</td>
<td>ISO M16</td>
</tr>
<tr>
<td>11</td>
<td>Hex. Nut Nylstop</td>
<td>ZN Nickel</td>
<td>2</td>
<td>ISO7040 M16</td>
</tr>
</tbody>
</table>

**EAST SIDE**

Assembly quantity per tracker: x1

Bolted connection (x1)

15: Hexagonal bolt / ISO4014 M16x90  
16: Plain washer / ISO M16  
12: Self-locking nut / M16

- Insert one (x1) hexagonal bolt (M16x90) and one plain washer under its head  
- Snug-tight the bolt (M16 thread inside cast iron part)  
- Add self-locking nut behind cast iron part for safety purpose

⚠️ **CAUTION**

This rotation is very important as required for the global tracker movement

**WEST SIDE**

Bolted connection (x1)

15: Hexagonal bolt / ISO4014 M16x90  
16: Plain washer / ISO M16  
11: Self-locking nut / M16

- Insert one (x1) hexagonal bolt (M16x90) with one plain washer under its head  
- Snug-tight the bolt (M16 thread inside cast iron part)  
- Add self-locking nut for safety purpose

⚠️ **CAUTION**

This rotation is very important as required for the global tracker movement
3. Assembly overview after pole structure assembly

- Assembly overview at this stage
10 Lifting tool assembly

This lifting tool will be temporarily mounted onto the steering arm reinforcement beam. It will be used during module support assembly to keep the tracker main beam assembly in a flat horizontal position in order to facilitate the installation of the PV modules.

10.1 Material details

Ball mounting fixture for assembly (x1)
Main dimension: 0.15m
Weight: Approx. 2 kg

10.2 Installation

1. Mounting of the ball mounting fixture onto the steering arm reinforcement beam.

Hardware required:

<table>
<thead>
<tr>
<th>N°</th>
<th>Part Name</th>
<th>Material</th>
<th>Quantity</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>65</td>
<td>Hex. Head Bolt</td>
<td>Galvanised Steel 8.8 Grade</td>
<td>4</td>
<td>ISO4014 M12x100</td>
</tr>
</tbody>
</table>
Assembly quantity per tracker: x1

Bolted connection (x4)

72: Ball mounting fixture upper part
73: Ball mounting fixture bottom part
75: Hexagonal bolt / ISO4014 M12x100

- Position the ball mounting fixture at 275mm from the top of the reinforcement beam
- Position the bottom plate under the reinforcement beam and tighten the four (x4) bolts (M12x100)

79 Nm
FASTENING TORQUE REQUIRED

2. Assembly overview after ball mounting fixture assembly

- Assembly overview at this stage
11 Module support assembly

11.1 Material details

The module support is the assembly which supports the array of PV modules. It is connected to the pole structure and tracker upper steering arm.

- **Main tracker beam pivot support (North config.) (x1)**
  - Main dimension: 0.3m
  - Weight: Approx. 7.8 kg

- **Main tracker beam pivot support (South config.) (x1)**
  - Main dimension: 0.3m
  - Weight: Approx. 7.3 kg

- **Reinforcement module support rail (x14)**
  - Main dimension: 1.0m
  - Weight: Approx. 1.51 kg

- **Module Support Rail (x7)**
  - Main dimension: 2.8m
  - Weight: Approx. 5.8 kg

- **External torque connection plate (x1)**
  - Main dimension: 6.3m
  - Weight: Approx. 39.6 kg

- **Internal torque connection plate (x1)**
  - Main dimension: 6.3m
  - Weight: Approx. 36.4 kg

For single tracker unit, pre-assembly is already done.
- Main dimension: 6.3m
- Weight: Approx. 96 kg
11.2 Installation

1. For single tracker unit installation, main beam is already fully assembled;

**CAUTION**

This action required lifting capacity. **Total weight of the beam is 96 KG.** All standard safety requirements for lifting need to be properly followed for this step.

Hardware required:

<table>
<thead>
<tr>
<th>N°</th>
<th>Part Name</th>
<th>Material</th>
<th>Quantity</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>Hex. Head Bolt</td>
<td>Galvanised Steel 8.8 Grade</td>
<td>1</td>
<td>ISO4014 M16x90</td>
</tr>
<tr>
<td>16</td>
<td>Plain washer</td>
<td>Galvanised Steel 8.8 Grade</td>
<td>1</td>
<td>ISO M16</td>
</tr>
<tr>
<td>12</td>
<td>Hex. Nut Nylstop</td>
<td>ZN Nickel</td>
<td>1</td>
<td>ISO7040 M16</td>
</tr>
</tbody>
</table>

Main beam can be lifted with proper lifting capacity.

Orientation of the main beam is important and needs to be respect.
1. Fixation of the North tracker beam pivot support

Assembly quantity per tracker: x1

Bolted connection (x1)

15: Hexagonal bolt / ISO4014 M16x90
16: Plain washer / ISO M16
12: Self-locking nut / M16

- Insert one bushing GFM1618-16
- Insert one (x1) hexagonal bolt (M16x90) with one (x1) plain washer under its head
- Tight the bolt (thread M16 inside cast iron part)
- Add self-locking nut for safety purpose
- Tight the nut M16

RESPECT ORIENTATION OF THE PART

CAUTION

Only snug-tight the M16 nut to permit free rotation of the main beam pivot around the North-South axis.

This rotation is very important as required for the global tracker movement.

CAUTION

Flange of the bushing (in red) needs to be in contact with cast iron part.
2. Fixation of the **South tracker beam pivot support**

Hardware required:

<table>
<thead>
<tr>
<th>N°</th>
<th>Part Name</th>
<th>Material</th>
<th>Quantity</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>Hex. Head Bolt</td>
<td>Galvanised Steel 8.8 Grade</td>
<td>1</td>
<td>ISO4014 M16x90</td>
</tr>
<tr>
<td>16</td>
<td>Plain washer</td>
<td>Galvanised Steel 8.8 Grade</td>
<td>1</td>
<td>ISO M16</td>
</tr>
<tr>
<td>12</td>
<td>Hex. Nut Nylstop</td>
<td>ZN Nickel</td>
<td>1</td>
<td>ISO7040 M16</td>
</tr>
</tbody>
</table>

**SOUTH SIDE**

Assembly quantity per tracker: x1

Bolted connection (x1)

15: Hexagonal bolt / ISO4014 M16x90
16: Plain washer / ISO M16
11: Self-locking nut / M16

- Insert one (x1) hexagonal bolt (M16x90) with one (x1) plain washer under its head
- Tight the bolt (thread M16 inside cast iron part)
- Add self-locking nut for safety purpose
- Orient the pivot support in a position as illustrated in this figure and tighten the M16 nut to temporally block the rotation of the pivot support during the next assembly steps

**CAUTION**

This M16 nut will need to be untightened at the end of tracker assembly to permit free rotation of the tracker main beam.

This rotation is very important as required for the global tracker movement.

**CAUTION**

Flange of the bushing (in red) needs to be in contact with cast iron part.
3. Attach the upper steering arm to the **North tracker beam pivot support** and connect it to the ball mounting fixture

**Hardware required:**

<table>
<thead>
<tr>
<th>No.</th>
<th>Part Name</th>
<th>Material</th>
<th>Quantity</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>60</td>
<td>Plain washer</td>
<td>Galvanised Steel 8.8 Grade</td>
<td>2</td>
<td>ISO M20</td>
</tr>
<tr>
<td>61</td>
<td>Circlip D20</td>
<td>Stainless Steel</td>
<td>2</td>
<td>D20</td>
</tr>
</tbody>
</table>

**Assembly quantity per tracker:** x1

- **52: Shaft of top steering arm**
- **53: Plain washer / ISO M20**
- **54: Circlip D20**

- Install bushing 4x GFM-2023-11
- Connect with the D20 shaft the upper steering arm to the tracker main beam pivot support
- Add one (x1) plain washer M20 and one (x1) circlip D20 on each side
- Connect coupling connector to the ball of the mounting fixture

**IMPORTANT NOTICE!**

Rotation along East-West & North-South axis will be blocked.

**CAUTION**

Flange of the bushing GFM2023-11 (in red) needs to be facing as presented below
4. Assembly overview after installation of the tracker upper steering arm

- Assembly overview at this stage

When the coupling connector is properly connected to the lifting tool assembly, the main beam is fully secured. All lifting equipment can be removed and work assembly can continue.

- Check that arrow is facing the [OK] to consider tracker installation as fully secured.
5. Installation of module support rail onto the tracker main beam

Hardware required:

<table>
<thead>
<tr>
<th>N°</th>
<th>Part Name</th>
<th>Material</th>
<th>Quantity</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>71</td>
<td>Screw Tensilock</td>
<td>ZN Nickel</td>
<td>14</td>
<td>ISO4017 M12x30</td>
</tr>
</tbody>
</table>

Assembly quantity per tracker: x14

71: Screw Tensilock
28: Module support rail

- Position each module support rail on top of the main beam
- Use the correct set of holes depending of PV modules installed (see table on the left)
- Installation of module support rails to the main beam with screw tensilock (see picture below).

It might appear some residual torsion on the main beam due to cold forming process fabrication. In order to correct this torsion you can add some M12 washers between module support rails and main beam. It will be better to consider the center module support rail as a reference and adjust southern and northern rails.

Reference module support rail
6. Assembly overview after assembly of the module support rails.

- Assembly overview at this stage

7. Installation of the module support reinforcement rails under the tracker main beam for each module support rail

Hardware required:

<table>
<thead>
<tr>
<th>N°</th>
<th>Part Name</th>
<th>Material</th>
<th>Quantity</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>Plain washer</td>
<td>Galvanised Steel 8.8 Grade</td>
<td>14</td>
<td>ISO M16</td>
</tr>
<tr>
<td>12</td>
<td>Hex. Nut Nylstop</td>
<td>ZN Nickel</td>
<td>14</td>
<td>ISO7040 M16</td>
</tr>
<tr>
<td>40</td>
<td>Screw Tensilock</td>
<td>ZN Nickel</td>
<td>14</td>
<td>ISO4017 M12x30</td>
</tr>
</tbody>
</table>

- Insert the locking feature into the mins beam slot (see details on the left) on each side
- Bend the reinforcement rail
- Insert one (x1) screw Tensilock M12x30 with (x1) washer and (x1) nut for final assembly at each end
- Tighten at the required torque value
- Repeat this operation for all module support rails.
8. Assembly overview after installation of module support reinforcement rails on each side of the main beam.

- Assembly overview at this stage
12 PV Module installation

12.1 Material details

HeliosLite tracker HLPV12 can support twelve (x12) modules 60 or 72 cells, Mono or Bi-facial. PV modules installed in a landscape configuration.

![PV Module](image)

PV Module 60 or 72 cells (x12)

12.2 Installation

1. Insert two CHC M8x20mm screw in the holes with thread located in the middle of the module support rails. These (optional) alignment enable accurate centering of the array of PV modules onto the tracker main beam.

Hardware required:

<table>
<thead>
<tr>
<th>N°</th>
<th>Part Name</th>
<th>Material</th>
<th>Quantity</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CHC screw M8x20mm</td>
<td>Zinc coating</td>
<td>14 or 28</td>
<td>-</td>
</tr>
</tbody>
</table>

- In order to define the North-South reference, holes described on the left can be used to insert standard rivets D6.4mm
- 2 configurations are available for Mono and Bi-facial modules.
CHC screws M8x20 are available in order to define the center line in the North-South direction.

- CHC screws M8x20 have to be inserted from below the module support rail. The pin will help to guide the module in the North-South direction.
2. Position and install the eight (x8) PV modules.

Hardware required:

<table>
<thead>
<tr>
<th>N°</th>
<th>Part Name</th>
<th>Material</th>
<th>Quantity</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>70</td>
<td>ARaymond Cinch Wide</td>
<td>Magnelis</td>
<td>32</td>
<td></td>
</tr>
</tbody>
</table>

Assembly quantity per tracker: x8

70: ARaymond Cinch clips

- Install the 8 PV module starting at the centre. Junction box is always above the main beam
- Use four (x4) Cinch per module to fix each module to the support rails. ARaymond clips positions are defined by specific windows on module support rail (see picture on the left).

IMPORTANT NOTICE!

The claw of the PV module clip must be positioned on the top side to enter into physical contact with the module aluminum frame for grounding purpose

WARNING

- Check that distance between aluminium module frame and module rail support is consistent with ARaymond specifications

IMPORTANT NOTICE!

powAR-Cinch is certified for PV module grounding (CEI 60349-1:2004 8.2.4.1)
- Specific spacer can be used to define space between modules
- A set of spacer can be 3D printed and used during alignment
3. External module installation

Hardware required:

<table>
<thead>
<tr>
<th>N°</th>
<th>Part Name</th>
<th>Material</th>
<th>Quantity</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ARaymond Cinch Wide</td>
<td>Magnelis</td>
<td>16</td>
<td>-</td>
</tr>
</tbody>
</table>

Assembly quantity per tracker: x

20: PV module
28: Module rail support
71: ARaymond Cinch clips

- For external module, ARaymond clips installation is specific on external rail.
- Insert ARaymond clip

- Use Head of M12 nut to hammer and put clip into position
4. PV cable routing

Hardware required:

<table>
<thead>
<tr>
<th>N°</th>
<th>Part Name</th>
<th>Material</th>
<th>Quantity</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Edge clip</td>
<td>Magnelis steel</td>
<td>12</td>
<td>51632001</td>
</tr>
</tbody>
</table>

Assembly quantity per tracker: x12

- Each slot holes can be equipped with metal edge clips.
- These edge clips are used for PV cable routing. 2 cables can be routed in parallel.
13 Lifting procedure

WARNING

Use proper lifting techniques when handling relevant components. Use proper equipment to protect against bodily injury.

<table>
<thead>
<tr>
<th>Hard hat</th>
<th>Safety goggles</th>
<th>Appropriate shoes</th>
<th>Gloves</th>
</tr>
</thead>
</table>

WARNING

Check that all bolts are tightened before lifting

For final lifting, the tracker should be well balanced with the same number of PV modules installed on both sides of the tracker main beam. A minimum of three (x3) workers are required for performing the tracker final lifting operation. This lifting operation should not be done manually if there is too much wind on site.
One worker must be positioned at the Southern side of the tracker to support the main beam assembly during the lifting procedure (~15 – 20 KG)

A second worker must be positioned next to the steering arm to disconnect and reconnect the coupling connector.

**WARNING**

Never push directly on module frame. Always use tracker structure to push tracker system.

The third worker should disconnect the coupling connector from the ball mounting fixture, ask the first worker to slowly lower the front side of the tracker main beam and then reconnect the coupling connector to the ball located at the top side of the tracker lower steering arm.

1. Assembly overview after lifting.

- Assembly overview at this stage
- Check that arrow is facing the [OK] range after final connection
14 Electrical connection

14.1 Master connection

1. Master controller box fixation onto the “master” tracker.

Hardware required:

<table>
<thead>
<tr>
<th>N°</th>
<th>Part Name</th>
<th>Material</th>
<th>Quantity</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>41</td>
<td>FIBOX Wall Mount Set</td>
<td>-</td>
<td>4</td>
<td>FP10674</td>
</tr>
<tr>
<td>42</td>
<td>Self-Tapping screws</td>
<td>-</td>
<td>4</td>
<td>STS</td>
</tr>
</tbody>
</table>

- x4 FIBOX Wall mount set need to be installed at the back of the SPM box as described on the picture on the left.

- Use 4x self-tapping screws to fix the Self Power Master (SPM) at the back of the main beam.
- Position of SPM is 3.3m from the North side of the main beam.

WARNING

PV Connector need to face South direction in order to avoid water collection during operation.

- x4 holes can be noticed (see picture on the left)
14.2 Tracker grounding

Hardware required:

<table>
<thead>
<tr>
<th>Part Name</th>
<th>Material</th>
<th>Quantity</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grounding cable</td>
<td>Copper</td>
<td>3m</td>
<td>6mm² flexible grounding copper wire</td>
</tr>
<tr>
<td>Rayvolt Grounding Clip</td>
<td>Steel C67S – Zinc Tin Alloy</td>
<td>1</td>
<td>220492006</td>
</tr>
<tr>
<td>Grounding Lug</td>
<td>Tin plated copper</td>
<td>1</td>
<td>TE 35665</td>
</tr>
</tbody>
</table>

- Connect one end of the grounding copper wire to the tracker main beam with a Rayvolt grounding clip. Square hole 35x35mm is located close to the steering arm.
- Rout the grounding copper wire along one of the North tube of the tracker pole structure
- Connect the lower end of the grounding copper wire to a grounding rod
- Depending on local grounding codes and soil electrical conductivity, the threaded rod of a ground anchor may be used as suitable earth grounding point
### 14.3 Annex

![Guide de serrage contrôlé (suite)](#)

<table>
<thead>
<tr>
<th>μ = 0.15</th>
<th>tableau de serrage pour visserie noire ou zinguée, lubrification sommaire (état d’ livraison) (coefficient de frottement MOYEN)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISO 272</td>
<td></td>
</tr>
<tr>
<td>Classe de qualité boulonnerie acier ISO898-1</td>
<td></td>
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<tr>
<td>d mm</td>
<td>ISO mm</td>
</tr>
<tr>
<td>1.4</td>
<td>3.5</td>
</tr>
<tr>
<td>2**</td>
<td>4</td>
</tr>
<tr>
<td>2.5**</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>0.50</td>
</tr>
<tr>
<td>4</td>
<td>0.60</td>
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<td>5</td>
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<td>6</td>
<td>1</td>
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<td>8</td>
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<td>10</td>
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<td>12</td>
<td>1.75</td>
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<td>15</td>
<td>2.25</td>
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<td>55**</td>
<td>5.5</td>
</tr>
<tr>
<td>60**</td>
<td>5.5</td>
</tr>
<tr>
<td>60**</td>
<td>6</td>
</tr>
</tbody>
</table>

Figure 14-1 Torque wrench guide
HeliosLite tracker
info@helioslite.com

Europe
Savoie Technolac
Bâtiment Lama
17 Avenue du Lac Léman
73370, Le Bourget du Lac, France

Tél : +33 9 81 73 92 76