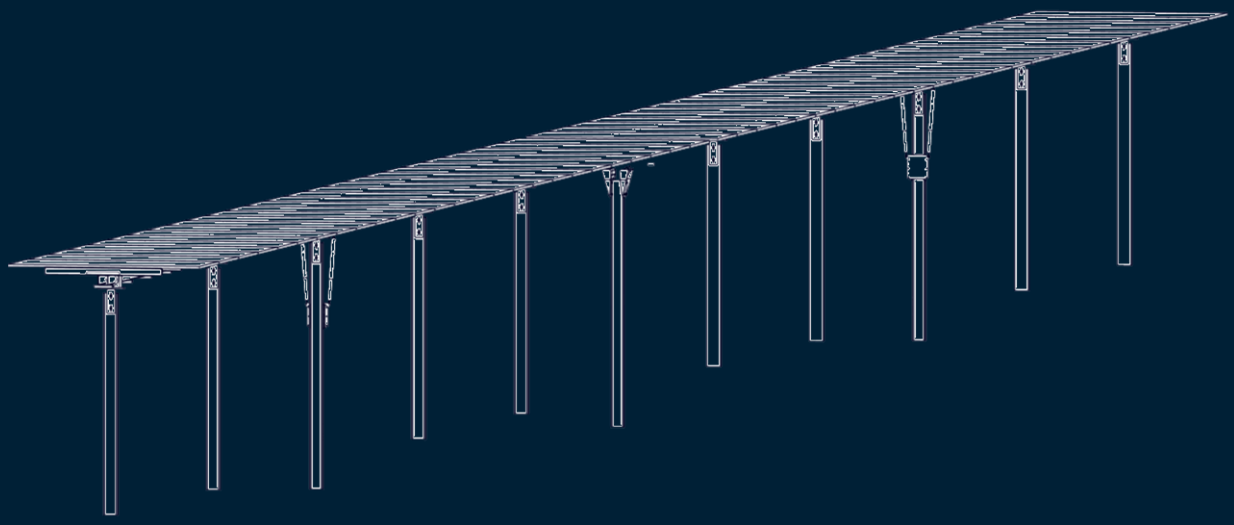
SolDrive Core

(IEC/TS 62727 aligned | IEC 61400-1 | EN 1991-1-4 | EN 1993-1-1 | IEC 61215)

Technical Specification

SolDrive Core

1. System Overview



The SolDrive Core is a horizontal single-axis solar tracker (HSAT) engineered for medium-scale photovoltaic installations where structural robustness, tracking accuracy, and long-term reliability are essential.

The system integrates:

- high-precision slew-drive actuation,
- an advanced astronomically-driven control unit,
- dual dynamic dampers for vibration suppression,
- corrosion-resistant support bearings,
- a Eurocode-compliant steel support structure,
- autonomous low-power operation.

The SolDrive Core is fully aligned with IEC/TS 62727 regarding performance parameters, stability, accuracy, and mechanical behavior of solar tracker

2. Mechanical Structure

2.1 Geometry & Motion Characteristics

- **Tracker Type**: Horizontal Single Axis Tracker (HSAT)
- **Rotation Range**: –60° to +60°
- **Nominal Tracking Speed**: 0.15°/s
- **Stow Angle**: 0° (horizontal safe position)

2.2 Row Structure

- **Maximum Row Length**: 70 m

- **Support Spacing**: 5–7 m (depending on structural loads)
- **Main Structural Members:**
  - C180 cold-formed steel sections
  - IPE160 hot-rolled beams
- **Material**: Structural steel S235
- **Protection**: Hot-dip galvanizing according to EN ISO 1461

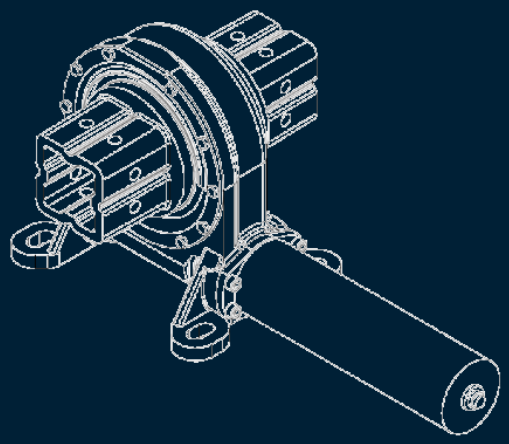
This structure provides high stiffness, low torsional deformation, and excellent durability under wind loading.

3. Actuation System – Slew Drive

The SolDrive Core is actuated by a high-torque, industrial-grade slewing drive assembly.

3.1 Mechanical Ratings

- **Gear Ratio**: 60:1
- **Tracking Precision**: ≤ 0.17°
- **Rated Output Torque**: 10 kN·m
- **Tilting Moment Capacity**: 45 kN·m
- **Holding Torque**: 63 kN·m
- **Static Radial Load**: 100 kN
- **Static Axial Load**: 65 kN
- **Dynamic Radial Load**: 60 kN
- **Dynamic Axial Load**: 45 kN
- **Hard Limit Stops**: ±60°



3.2 Motor

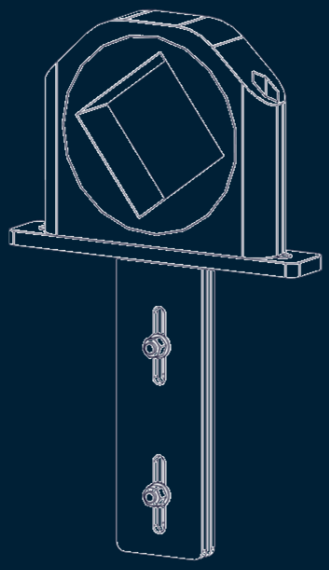
- **Operating Voltage**: 24 V DC
- **Motor Torque**: 300 N·m
- **Rated Current**: ≤ 6.5 A
- **Protection Level**: IP65
- **Connector**: Weipu SP2113/P3

The slew drive provides stable movement, high wind resistance, and long service life.

4. Support Bearings – ZA120A

The intermediate supports of the tracker employ ZA120A bearings, designed for torsion tube support in long-span trackers.

4.1 Construction & Materials



- Housing: ZAM alloy + aluminum base
- T-shape base: Q235 steel, hot-dip galvanized
- Compatible with 120×120 mm profiles
- Pivot Angle: ±10° for thermal expansion accommodation

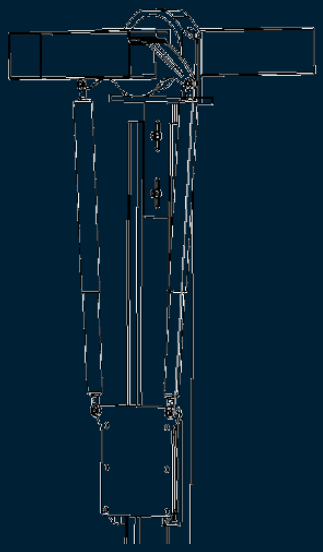
4.2 Mechanical Performance

- Tensile Strength: ~55 kN
- Compression Strength (0°): ~50 kN
- Compression Strength (10° tilt): ~54 kN
- Shear Strength: ~55 kN
- Push-out Resistance: ~16 kN

Corrosion Resistance: 480 hours salt spray test

These bearings ensure stable load distribution and long-term reliability.

5. Dual Dynamic Dampers – Vibration Suppression System



The SolDrive Core incorporates **dual high-efficiency dampers**, positioned symmetrically on the structure to control dynamic movement under wind excitation.

5.1 Functional Purpose

The dampers:

- absorb vibration energy along the tracker axis,
- reduce torsional oscillations caused by wind gusts,
- stabilize the torque tube during high-frequency disturbances,
- lower the system's natural frequencies to prevent resonance.

5.2 Mechanical Benefits

A. Wind-Induced Oscillation Reduction (60–80%)

The dampers suppress lateral oscillations and prevent escalation of dynamic movement.

B. Reduced Structural Stress

By absorbing dynamic loads, the dampers:

- decrease torsional deformation of the torque tube,
- minimize bending stress on C180 / IPE160 supports,
- reduce peak loads transmitted to the ZA120A bearings.

C. PV Module Protection

Lower vibration levels:

- protect module frames,
- prevent micro-cracking,
- increase long-term PV module lifespan.

D. Improved Aeroelastic Stability

The system significantly reduces the risk of wind-induced galloping on long tracker rows.

5.3 Integration With Safety System

The dampers work together with:

- wind sensor stow triggers,
- electronic fail-safe logic,

6. PV Module Configuration

- Orientation: Portrait
- Modules per Row: 60
- Compatibility: All IEC 61215 certified framed PV modules
- High structural stiffness minimizes misalignment and frame stress.

7. Power & Autonomy System

7.1 Battery Pack

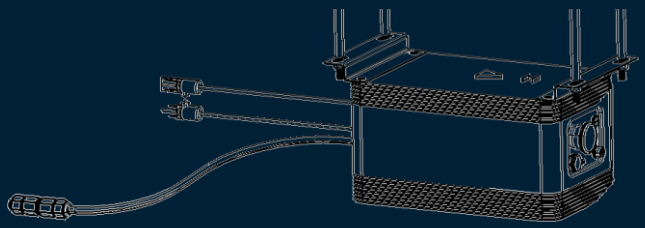
- Type: Li-ion 7S1P (29.4 V)
- Capacity: 3000 mAh
- Discharge Capability: 10 A
- Integrated BMS protections
- Provides reliable off-grid autonomy for tracking and stow operations.

7.2 Low-Power Architecture

- Daily consumption: ≤0.1 kWh/day
- PV-powered charging system ensures fully autonomous operation.

8. Controller

The controller is the core of the automatic tracking system.



8.1 Control Algorithms

- Astronomical positioning
- Tilt sensor closed-loop correction
- Backtracking for row-to-row shading reduction
- Automatic and manual control modes

8.2 Electrical Specifications

- Input Voltage: **300–1500 VDC**
- Output Voltage: **24 VDC**
- Maximum Output Power: **≤150 W**
- Tracking Accuracy: **±1°**
- Protection Rating: **IP65**

8.3 Environmental Conditions

- Operating Temperature: –20°C to +60°C
- Weatherproof enclosure suitable for outdoor installation

9. Safety, Wind Stow & Electronic Protection

9.1 Multi-Source Stow Triggers

The tracker enters safe position (0°) when any of the following is detected:

- **Wind Sensor (Anemometer)**
- **Scheduled night stow**

9.2 Electronic Fail-Safe Logic

If any trigger is activated, the controller immediately halts tracking and moves the system to the safe stow angle.

9.3 Mechanical Assistance

The Dual Dampers improve stability during the transition to stow.

10. Standards & Compliance

The SolDrive Core is engineered according to:

- **IEC/TS 62727:2012** — Solar Trackers
- **IEC 61400-1** — Wind load and gust analysis
- **EN 1991-1-4** — Wind actions (Eurocode 1)
- **EN 1993-1-1** — Steel structures (Eurocode 3)
- **IEC 61215** — PV module requirements
- **EN ISO 1461** — Hot-dip galvanizing

11. Summary

The **SolDrive Core** is a robust, reliable, and highly optimized solar tracking system combining:

- precision slew-drive mechanics,
- dual vibration dampers,
- advanced astronomical control,
- long-life structural bearings,
- Eurocode-compliant frame geometry,
- autonomous operation,
- multi-layered safety and wind protection.

It is suitable for:

- industrial solar plants,
- agrivoltaic installations,
- off-grid PV systems,
- high-wind sites,
- long-row configurations up to 70 m.