

# Product Catalog

Our systems and solutions for photovoltaic power plants



[www.solar-motors.com](http://www.solar-motors.com)

## General Terms and Conditions

## Dear Customers,

Photovoltaic electricity, once confined to space exploration, has since the beginning of the 21st century, gained access to the realm of power generation.

The impressive growth of the PV market, mainly driven during those years by the European interest for this particular technology, has since then led to a major decrease in system prices, bringing PV technology among the emerging technologies for power generation on a large scale.

At Sat Control we are proud to be one of the first companies worldwide to successfully implement innovative, cost-effective, reliable, robust and active solar tracking systems in the world.

Sat Control accelerates technological innovations by industry led research and development tracking systems offering outstanding long-term performance. Sat Control provides solutions that demonstrate cost effectiveness, added value, and go beyond the business. Setting the highest quality standards is Sat Control's main objective.

Sat Control products are a result of intensive research and development efforts, manufactured in a state of the art automated production environment and comply with the principal international standards: International Protection Rating (IEC 60529 IP33), Electromagnetic Compatibility (EMC Direc-

tive 89/336/EEC) and Low Voltage Equipment Directive (EEC Council Directive 73/23/EEC).

Components and materials used in production originate from well established suppliers, are pre-certified, tested and meet the highest quality standards. Due to the strict quality control at each step of the production process, Sat Control is able to offer its customers up to 10-year product warranty.

Headquartered in Slovenia, at Sat Control we find our place predominantly in diverse international markets. Tracker installations of every size have been deployed internationally, including utility-scale projects in more than 45 countries over the world including Germany, France, Italy, Slovakia, Czech Republic, Australia, India, Canada and the United States.

Sat Control's strategic goal is to become globally innovative and competitive Solar Energy enterprise, providing the most appropriate solar tracking technology for achieving the highest performance and most cost-effective production of solar electricity.

Bogdan Bolka  
CEO of Sat Control



Malá Domaša, Slovakia, 264  
Trenčín, Slovakia, 144  
Lazany, Slovakia, 362  
Iža, Slovakia, 426  
Czech Republic, Zbraslav, 100  
Romania, Moldovanesti  
Romania, Ucea de Sus  
Romania, Victoria, 3 MW  
Italy, Vittoria, 78  
Ptuj, Slovenija, 3,75 kWp  
Spain, Madrid, 170  
Cyprus, Nicosia, 20  
Holeby, Denmark  
Horsholm, Denmark, 12

Great Britains, Hexam, 3,75 kWp  
Japan, Wakabayashi, 22  
Japan, Taguchi, 32  
Japan, Shimada, 44  
Thailand, Lampang, 120 MW  
Thailand, Phitsanulok, 120 MW  
Jordan, Amman, 6  
Canada, Quebec, 10,95 kWp  
Japan, Fujii, 50  
Japan, Ogura, 50  
Australia, Mullumbimby, 12  
New Zealand, Auckland, 3,75 kWp  
South Africa

### Dual-Axis SOLAR TRACKER for 15 panels ST44M3V15P

Code: 0153

- With time-derived astronomical positioning for the automatic sun-tracking
- Dual-axis solar tracker with embedded positioner
- Time controlled astronomical algorithm for sun tracking
- Simple installation and synchronization of sun time
- Usable for PV, CPV and lighter thermal panels and Heliostats
- 7 hours of automatic tracking at perpendicular angle
- User friendly web interface for monitoring, setting and upgrading
- USB communication port, optionally RS485
- For surface area up to 25 m<sup>2</sup> and max. 345 kg
- Made in Europe

#### Mechanical Capabilities

- Dual-Axis
- Hour Angle Limit 100°, software and hardware limit 50°E to 50°W
- Elevation angle 15-90°, adjustable start
- Hour-angle motor, Linear Motor SM4S900M3 with stroke of 900 mm
- Elevation-angle motor: Linear Motor SSM4S900M3 with stroke of 900 mm
- For 15 pieces of solar panels, dimensions 0,99 m x 1,65 m in total 25 m<sup>2</sup>
- Max. weight of solar panels, 23 kg/panel

#### Positioning System Data

- Operating Protocol TdAPS (Time derived Astronomical Positioning System)
- GMT clock timer with EOT and calendar

#### Communication Data

- USB communication interface
- Networking solution for control from centre RS485

#### Electrical Data

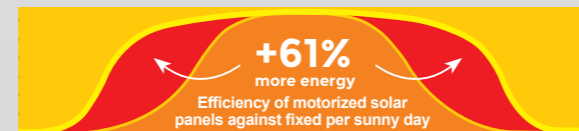
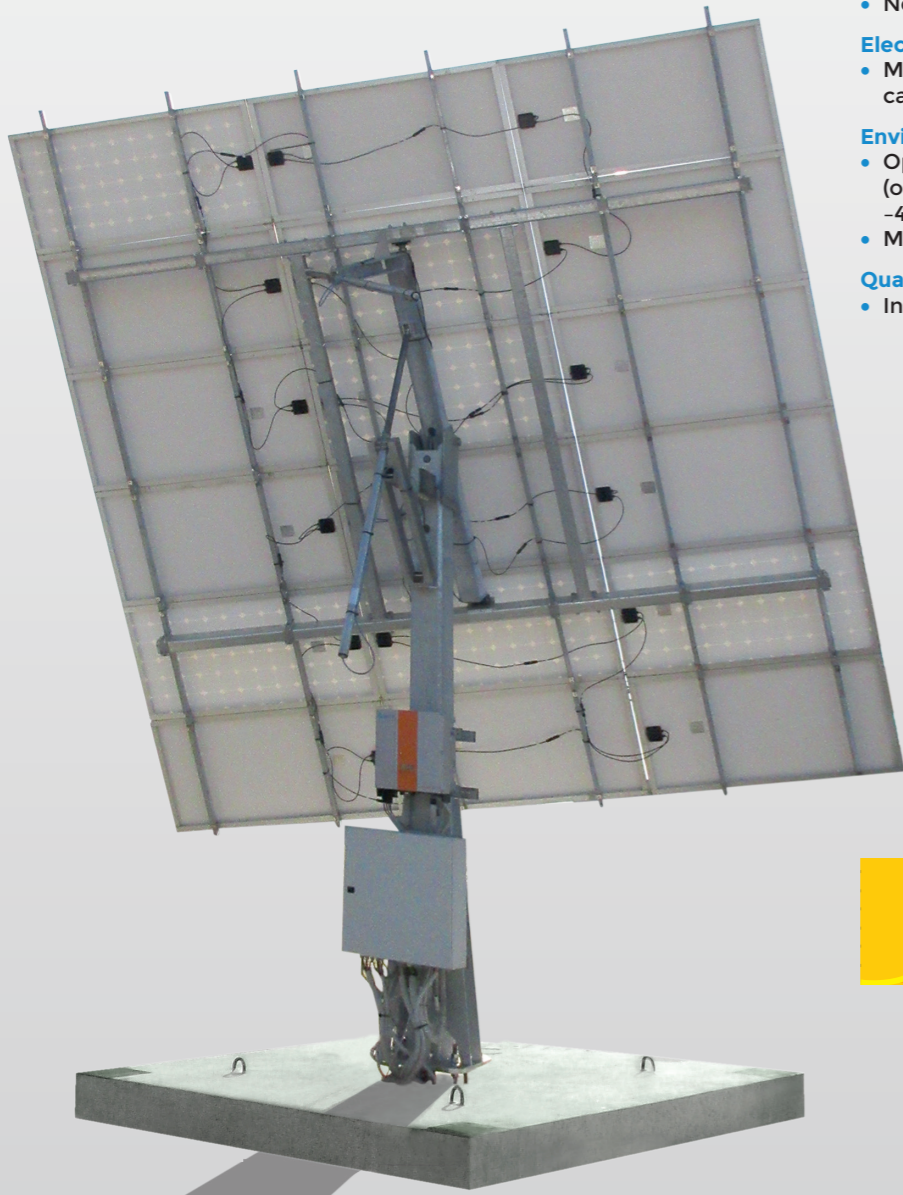
- Motor Power Supply 24 VDC ± 15% (2.5A current capacity) SMPS must have 150% inrush current

#### Environmental Data

- Operating temperature from -25°C to +70°C (optionally with arctic grease for temperatures from -40°C up to +70°C)
- Max. safe wind speed 144 km/h

#### Quality Certificates

- International Protection Rating (IEC 60529) IP63



More information visit



### ST54 Dual-Axis SOLAR TRACKER ST54M3S30 with slewing drive for 30 m2

Code: 0099

- Slewing drive with 350° turning range
- With time-derived astronomical positioning for the automatic sun-tracking
- Dual-axis azimuth-elevation solar tracker with embedded positioner
- Time controlled astronomical algorithm for sun tracking
- Simple installation and synchronization of sun time
- Usable for PV, CPV and lighter thermal panels and Heliostats
- Up to 23 hours automatic tracking at perpendicular angle
- User friendly web interface for monitoring, setting and upgrading
- USB communication port, RS485 or Wireless (ZigBee communication module)
- For surface area up to 30m<sup>2</sup> and max. 375 kg
- Made in Europe

#### Mechanical Capabilities

- Dual-Axis
- Azimuth angle range, 350° slewing drive
- Elevation angle range, 5° to 90°
- Azimuth angle motor, slewing drive SD5M3
- Elevation angle motor, Linear Motor SM4S900M3 with stroke of 900 mm
- Max. dimensions of a solar panel, 15 pieces of 2 m x 1 m in total 30 m<sup>2</sup>
- Max. weight of a solar panel, 15 pcs per 25 kg

#### Positioning System Data

- Tracking accuracy, up to 0,1°
- TdAPS (Time derived Astronomical Positioning System)
- GMT clock with EOT and calenda

#### Communication Data

- USB interface for Micro-D; RS485 or Wireless ZigBee for Nano-D
- Networking solution for control from centre, RS485 or Wireless ZigBee for Nano-D

#### Electrical Data

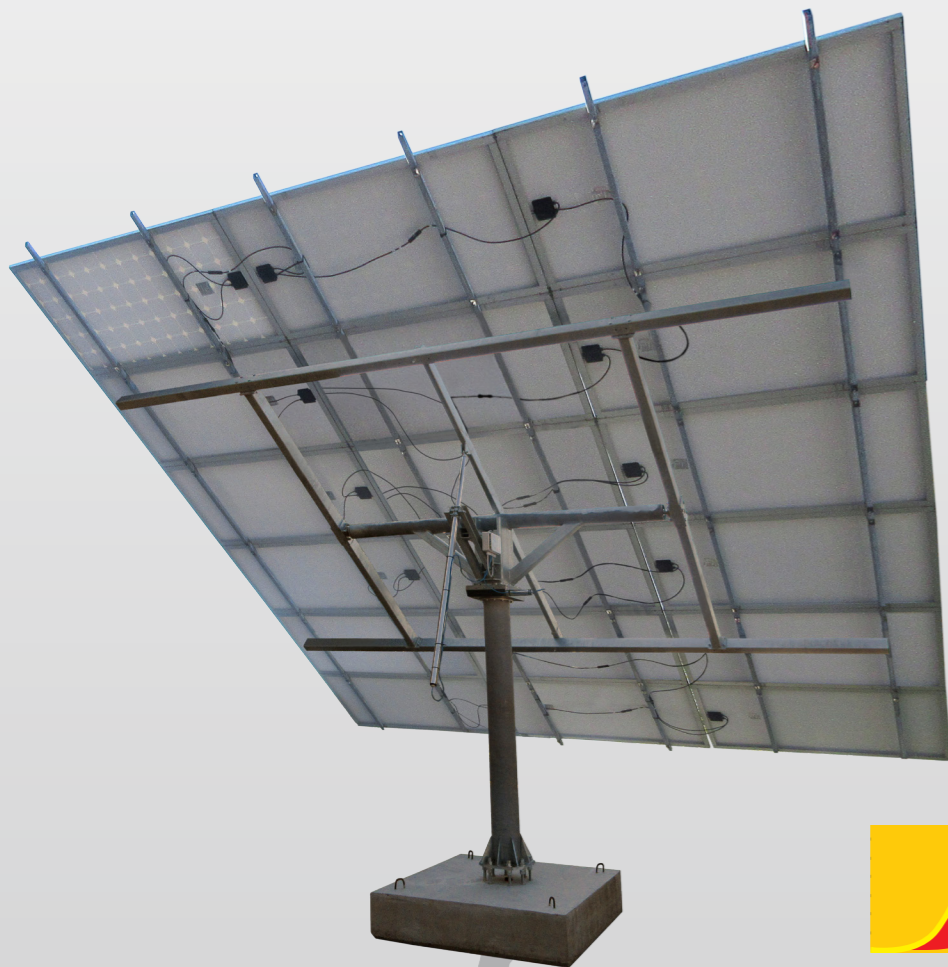
- Motor Power Supply, 24 VDC ± 15% (5A current capacity) SMPS must have 150% inrush current

#### Environmental Data

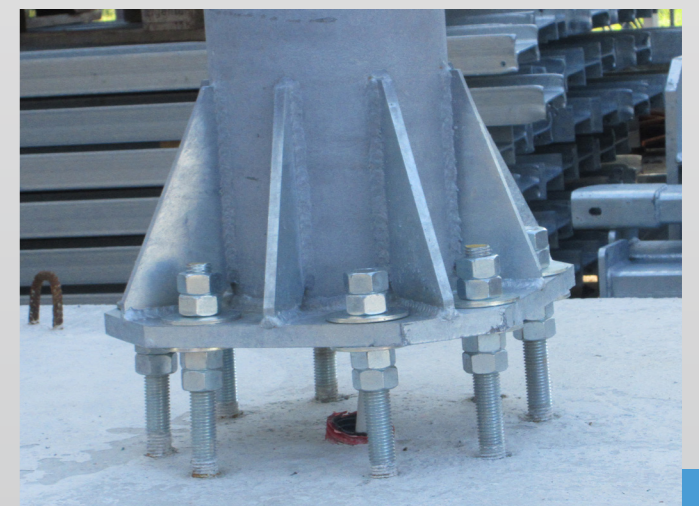
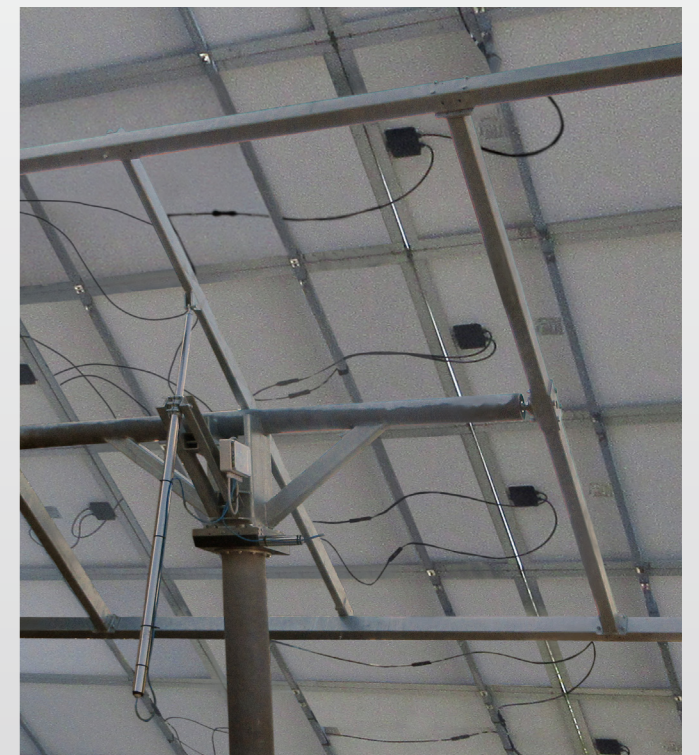
- Operating temperature, -25°C to +70°C (with artic grease from -40°C up to +70°C)
- Wind parameters, max. wind speed in operating in any working position is 20 m/s, survival max. wind gust speed not operating is 30 m/s

#### Quality Certificates

- International Protection Rating (IEC 60529), IP63



More information visit



### Dual-Axis SOLAR TRACKER for 4 panels, model ST44M2V4P

Code: 0103

- With time-derived astronomical positioning for the automatic sun-tracking
- Dual-axis solar tracker with embedded positioner
- Time controlled astronomical algorithm for sun tracking
- Simple installation and synchronization of sun time
- Usable for PV, CPV and lighter thermal panels and Heliostats
- 7 hours of automatic tracking at perpendicular angle
- User friendly web interface for monitoring, setting and upgrading
- USB communication port, optionally RS485
- For surface area up to 6,5 m<sup>2</sup> and max. 80 kg
- Made in Europe

#### Mechanical Capabilities

- Dual-Axis
- Hour Angle Limit 100°, software and hard ware limit 50°E to 50°W
- Elevation angle 15-90°, adjustable start
- Hour-angle motor, Linear Motor SM4S510M2 with stroke of 510 mm
- Elevation-angle motor: Linear Motor SM4S510M2 with stroke of 510 mm
- For 4 pieces of solar panels, dimensions 0,99 m x 1,65 m in total 6,5 m<sup>2</sup>
- Max. weight of solar panels, 20 kg/panel

#### Positioning System Data

- Operating Protocol TdAPS (Time derived Astronomical Positioning System)
- GMT clock timer with EOT and calendar

#### Communication Data

- USB communication interface
- Networking solution for control from centre RS485

#### Electrical Data

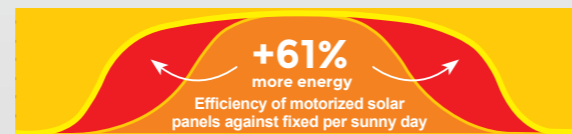
- Motor Power Supply 24 VDC ± 15% (2.5A current capacity) SMPS must have 150% inrush current

#### Environmental Data

- Operating temperature from -25°C to +70°C (optionally with artic grease for teperatures from -40°C up to +70°C)
- Max. safe wind speed 120 km/h

#### Quality Certificates

- International Protection Rating (IEC 60529) IP63



More information visit



### Dual-Axis SOLAR TRACKER for 3 panels ST44M2V3P

Code: 0121

- With time-derived astronomical positioning for the automatic sun-tracking
- Dual-axis solar tracker with embedded positioner
- Time controlled astronomical algorithm for sun tracking
- Simple installation and synchronization of sun time
- Usable for PV, CPV and lighter thermal panels and Heliostats
- 7 hours of automatic tracking at perpendicular angle
- User friendly web interface for monitoring, setting and upgrading
- USB communication port, optionally RS485
- For surface area up to 4,9 m<sup>2</sup> and max. 60 kg
- Made in Europe

#### Mechanical Capabilities

- Dual-Axis
- Hour Angle Limit 100°, software and hard ware limit 50°E to 50°W
- Elevation angle 15-90°, adjustable start
- Hour-angle motor, Linear Motor SM4S510M2 with stroke of 510 mm
- Elevation-angle motor: Linear Motor SM4S510M2 with stroke of 510 mm
- For 3 pieces of solar panels, dimensions 0,99 m x 1,65 m in total 4,9 m<sup>2</sup>
- Max. weight of solar panels, 20 kg/panel

#### Positioning System Data

- Operating Protocol TdAPS (Time derived Astronomical Positioning System)
- GMT clock timer with EOT and calendar

#### Communication Data

- USB communication interface
- Networking solution for control from centre RS485

#### Electrical Data

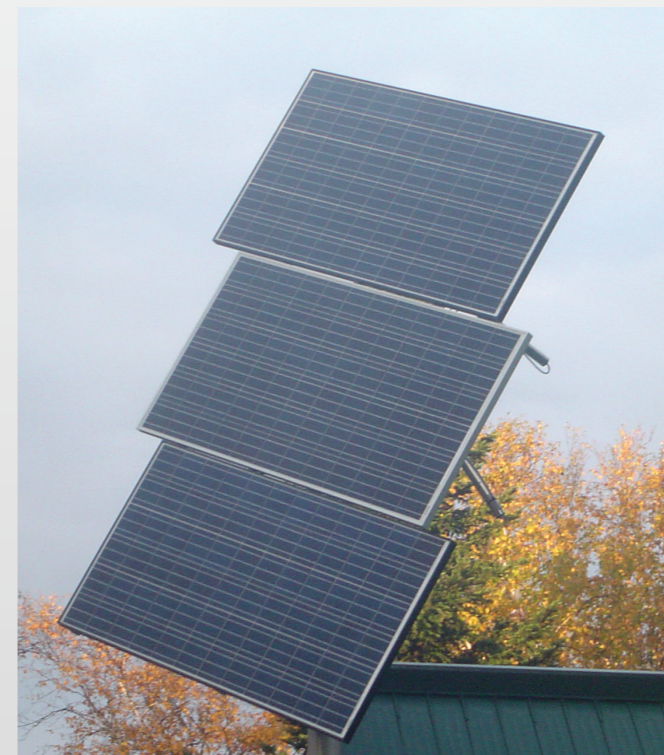
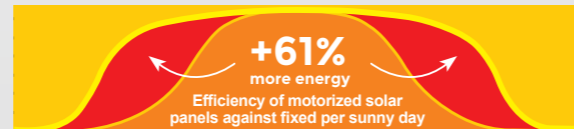
- Motor Power Supply 24 VDC ± 15% (2.5A current capacity) SMPS must have 150% inrush current

#### Environmental Data

- Operating temperature from -25°C to +70°C (optionally with artic grease for temperatures from -40°C up to +70°C)
- Max. safe wind speed 144 km/h

#### Quality Certificates

- International Protection Rating (IEC 60529) IP63



More information visit

### Dual-Axis SOLAR TRACKER for 2 panels ST44M2V2P

Code: 0124

- With time-derived astronomical positioning for the automatic sun-tracking
- Dual-axis solar tracker with embedded positioner
- Time controlled astronomical algorithm for sun tracking
- Simple installation and synchronization of sun time
- Usable for PV, CPV and lighter thermal panels and Heliostats
- 7 hours of automatic tracking at perpendicular angle
- User friendly web interface for monitoring, setting and upgrading
- USB communication port, optionally RS485
- For surface area up to 3,3 m<sup>2</sup> and max. 40 kg
- Made in Europe

#### Mechanical Capabilities

- Dual-Axis
- Hour Angle Limit 100°, software and hard ware limit 50°E to 50°W
- Elevation angle 15-90°, adjustable start
- Hour-angle motor, Linear Motor SM4S510M2 with stroke of 510 mm
- Elevation-angle motor: Linear Motor SM4S510M2 with stroke of 510 mm
- For 2 pieces of solar panels, dimensions 0,99 m x 1,65 m in total 3,3 m<sup>2</sup>
- Max. weight of solar panels, 20 kg/panel

#### Positioning System Data

- Operating Protocol TdAPS (Time derived Astronomical Positioning System)
- GMT clock timer with EOT and calendar

#### Communication Data

- USB communication interface
- Networking solution for control from centre RS485

#### Electrical Data

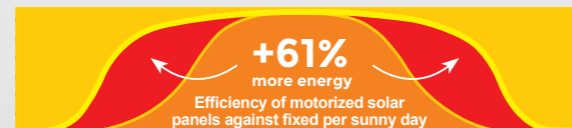
- Motor Power Supply 24 VDC ± 15% (2.5A current capacity)
- SMPS must have 150% inrush current

#### Environmental Data

- Operating temperature from -25°C to +70°C (optionally with arctic grease for temperatures from -40°C up to +70°C)
- Max. safe wind speed 144 km/h

#### Quality Certificates

- International Protection Rating (IEC 60529) IP63



More information visit

### Single axis on-line tracker for 24 panels

Code: 0179

- 25 years operational life
- up to 10 year warranty
- ultra low maintenance
- low power consumption
- easy installation set up
- equipped with powerful analytics
- backtracking function included
- designed and manufactured in EU

#### Mechanical Capabilities

- Single-Axis
- Hour Angle Limit 100°, software and hard ware limit 50°E to 50°W
- Elevation angle, horizontal in-line tracker
- Hour-angle motor, Linear Motor SM4S700M3 with stroke of 700 mm
- For 24 pieces of solar panels, dimensions 0,99 m x 1,65 m in total 47,5 m<sup>2</sup>
- Max. weight of solar panels, 25 kg/panel

#### Positioning System Data

- Operating Protocol TdAPS (Time derived Astronomical Positioning System)
- GMT clock timer with EOT and calendar

#### Communication Data

- USB communication interface
- Networking solution for control from centre RS485

#### Electrical Data

- Motor Power Supply 24 VDC ± 15% (2.5A current capacity) SMPS must have 150% inrush current

#### Environmental Data

- Operating temperature from - 25°C to +70°C (optionally with artic grease for teperatures from -40°C up to +70°C)
- Max. safe wind speed 180 km/h

#### Quality Certificates

- International Protection Rating (IEC 60529) IP63



More information visit





### Single-Axis SOLAR TRACKER for 4 panels ST40M2V4P

Code: 0104

- With time-derived astronomical positioning for the automatic sun-tracking
- Single-Axis solar tracker with embedded positioner
- Time controlled astronomical algorithm for sun tracking
- Simple installation and synchronization of sun time
- Usable for PV, CPV and lighter thermal panels
- 7 hours of automatic tracking at perpendicular angle
- User friendly web interface for monitoring, setting and upgrading
- USB communication port, optionally RS485
- For surface area up to 6,5 m<sup>2</sup> and max 80 kg
- Made in Europe

#### Mechanical Capabilities

- Single-Axis
- Hour Angle Limit 100°, software and hard ware limit 50°E to 50°W
- Elevation angle 15-90°, adjustable start
- Hour-angle motor, Linear Motor SM4S510M2 with stroke of 510 mm
- For 4 pieces of solar panels, dimensions 0,99 m x 1,65 m in total 6,5 m<sup>2</sup>
- Max. weight of solar panels, 20 kg/panel

#### Positioning System Data

- Operating Protocol TdAPS (Time derived Astronomical Positioning System)
- GMT clock timer with EOT and calendar

#### Communication Data

- USB communication interface
- Networking solution for control from centre RS485

#### Electrical Data

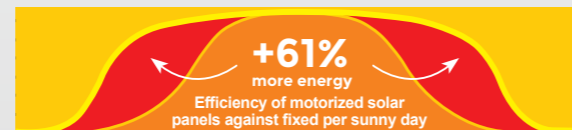
- Motor Power Supply 24 VDC ± 15% (2.5A current capacity) SMPS must have 150% inrush current

#### Environmental Data

- Operating temperature from- 25°C to +70°C (optionally with artic grease for teperatures from -40°C up to +70°C)
- Max. safe wind speed 100 km/h

#### Quality Certificates

- International Protection Rating (IEC 60529) IP63



More information visit



### Single-Axis SOLAR TRACKER for 3 panels ST40M2V3P

Code: 0115

- With time-derived astronomical positioning for the automatic sun-tracking
- Single-Axis solar tracker with embedded positioner
- Time controlled astronomical algorithm for sun tracking
- Simple installation and synchronization of sun time
- Usable for PV, CPV and lighter thermal panels
- 7 hours of automatic tracking at perpendicular angle
- User friendly web interface for monitoring, setting and upgrading
- USB communication port, optionally RS485
- For surface area up to 4,9 m<sup>2</sup> and max 60 kg
- Made in Europe

#### Mechanical Capabilities

- Single-Axis
- Hour Angle Limit 100°, software and hard ware limit 50°E to 50°W
- Elevation angle 15-90°, adjustable start
- Hour-angle motor, Linear Motor SM4S510M2 with stroke of 510 mm
- For 3 pieces of solar panels, dimensions 0,99 m x 1,65 m in total 4,9 m<sup>2</sup>
- Max. weight of solar panels, 20 kg/panel

#### Positioning System Data

- Operating Protocol TdAPS (Time derived Astronomical Positioning System)
- GMT clock timer with EOT and calendar

#### Communication Data

- USB communication interface
- Networking solution for control from centre RS485

#### Electrical Data

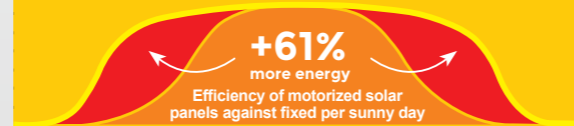
- Motor Power Supply 24 VDC ± 15% (2.5A current capacity) SMPS must have 150% inrush current

#### Environmental Data

- Operating temperature from- 25°C to +70°C (optionally with artic grease for teperatures from -40°C up to +70°C)
- Max. safe wind speed 120 km/h

#### Quality Certificates

- International Protection Rating (IEC 60529) IP63



More information visit



### Single-Axis SOLAR TRACKER for 2 panels ST40M2V2P

Code: 0122

- With time-derived astronomical positioning for the automatic sun-tracking
- Single-Axis solar tracker with embedded positioner
- Time controlled astronomical algorithm for sun tracking
- Simple installation and synchronization of sun time
- Usable for PV, CPV and lighter thermal panels
- 7 hours of automatic tracking at perpendicular angle
- User friendly web interface for monitoring, setting and upgrading
- USB communication port, optionally RS485
- For surface area up to 4,9 m<sup>2</sup> and max 60 kg
- Made in Europe

#### Mechanical Capabilities

- Single-Axis
- Hour Angle Limit 100°, software and hard ware limit 50°E to 50°W
- Elevation angle 15-90°, adjustable start
- Hour-angle motor, Linear Motor SM4S510M2 with stroke of 510 mm
- For 2 pieces of solar panels, dimensions 0,99 m x 1,65 m in total 3,3 m<sup>2</sup>
- Max. weight of solar panels, 20 kg/panel

#### Positioning System Data

- Operating Protocol TdAPS (Time derived Astronomical Positioning System)
- GMT clock timer with EOT and calendar

#### Communication Data

- USB communication interface
- Networking solution for control from centre RS485

#### Electrical Data

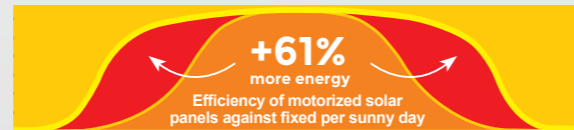
- Motor Power Supply 24 VDC ± 15% (2.5A current capacity) SMPS must have 150% inrush current

#### Environmental Data

- Operating temperature from- 25°C to +70°C (optionally with artic grease for teperatures from -40°C up to +70°C)
- Max. safe wind speed 144 km/h

#### Quality Certificates

- International Protection Rating (IEC 60529) IP63



More information visit

### Single-Axis SOLAR TRACKER for 1 panel SM3SPMOG+

Code: 0135

- With time-derived astronomical positioning for the automatic sun-tracking
- Single-Axis solar tracker with embedded positioner
- Time controlled astronomical algorithm for sun tracking
- Simple installation and synchronization of sun time
- Usable for PV and lighter thermal panels
- 100° correspond to 6,7 hours of automatic tracking at perpendicular angle
- User friendly web interface for monitoring, setting and upgrading
- Communication port RS485
- For surface area up to 2m<sup>2</sup> and max. 25 kg
- Made in Europe

#### Mechanical Capabilities

- Single-Axis
- Hour Angle Limit 92° typical / 100° max., software and hardware limit (46°E to 46°W)
- Elevation angle 75°, manual fixation
- Hour-angle motor, Brush DC motor with position encoder on cogwheel
- 1 piece of 2,0 m x 1,0 m in total 2,0 m<sup>2</sup>
- Max. weight of solar panels, 25 kg/panel

#### Positioning System Data

- Operating Protocol TdAPS (Time derived Astronomical Positioning System)
- GMT clock timer with EOT and calendar

#### Communication Data

- USB communication interface
- Networking solution for control from centre RS485

#### Electrical Data

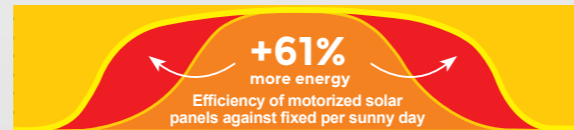
- Motor Power Supply recommended constant 12 VDC (working from 10 to 15 VDC), (1 A current capacity @ 12V)

#### Environmental Data

- Operating temperature from- 25°C to +70°C
- Max. safe wind speed 130 km/h

#### Quality Certificates

- International Protection Rating (IEC 60529) IP33, water resistant



More information visit



### Dual-Axis Heliostat for mirror application up to 25 m<sup>2</sup>

Code: 0105 - ST44M3HEL25M

- With time-derived astronomical positioning for the automatic sun-tracking
- Dual-Axis solar tracker with embedded positioner
- Time controlled astronomical algorithm for sun tracking
- Simple installation and synchronization of sun time
- Usable for Heliostats, Tower Receiver CSP and Natural Daylighting System
- 13 hours of automatic tracking and sun mirroring
- User friendly web interface for monitoring, setting and upgrading
- USB communication port, RS485
- For surface area up to 25m<sup>2</sup> and max 450 kg
- Made in Europe

#### Mechanical Capabilities

- Dual-Axis
- Hour Angle Limit 100°, software and hardware limit
- Elevation angle 15-90°, adjustable start
- Hour-angle motor, Linear Motor SM4S900M3 with stroke of 900 mm
- Elevation-angle motor: Linear Motor SM4S900M3 with stroke of 900 mm
- For 8 pieces of mirror panels, dimensions of 1.250 mm x 2.500 mm with net surface of 25 m<sup>2</sup>
- Max. weight of mirror panel, 30 kg/panel

#### Positioning System Data

- Operating Protocol TdAPS (Time derived Astronomical Positioning System)
- GMT clock timer with EOT and calendar

#### Communication Data

- USB communication interface
- Networking solution for control from centre RS485

#### Electrical Data

- Motor Power Supply 24 VDC ±15% (5A current capacity) SMPS must have 150% inrush current

#### Environmental Data

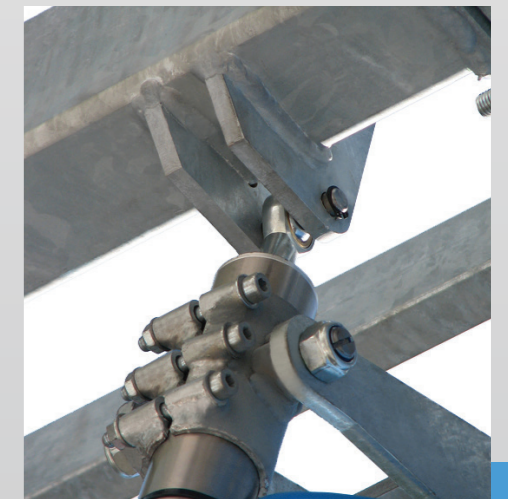
- Operating temperature from -25°C to +70°C (optionally with artic grease for temperatures from -40°C up to +70°C)
- Max. safe wind speed 144 km/h

#### Quality Certificates

- International Protection Rating (IEC 60529) IP63



More information visit



## Dual-Axis Heliostat for mirror application up to 6,2 m<sup>2</sup>

Code: 0110 - ST44M2HEL6M

- With time-derived astronomical positioning for the automatic sun-tracking
- Dual-Axis solar tracker with embedded positioner
- Time controlled astronomical algorithm for sun-tracking
- Simple installation and synchronization of sun time
- Usable for Heliostats, Tower Receiver CSP and Natural Daylighting System
- 13 hours of automatic tracking and sun mirroring
- User friendly interface for monitoring, setting and upgrading
- USB communication port, RS485
- For surface area up to 6,2m<sup>2</sup> and max 90 kg
- Made in Europe

### Mechanical Capabilities

- Dual-Axis
- Hour Angle Limit 100°, software and hard ware limit 50°E to 50°W
- Elevation angle 15-90°, adjustable start
- Hour-angle motor, Linear Motor SM4S510M2 with stroke of 510 mm
- Elevation-angle motor: Linear Motor SM4S510M2 with stroke of 510 mm
- For 2 pieces of mirror panel, dimensions of 1.250 mm x 2.500 mm with net surface of 6,2 m<sup>2</sup>
- Max. weight of mirror panel, 30 kg/mirror

### Positioning System Data

- Operating Protocol TdAPS (Time derived Astronomical Positioning System)
- GMT clock timer with EOT and calendar

### Communication Data

- USB communication interface
- Networking solution for control from centre RS485

### Electrical Data

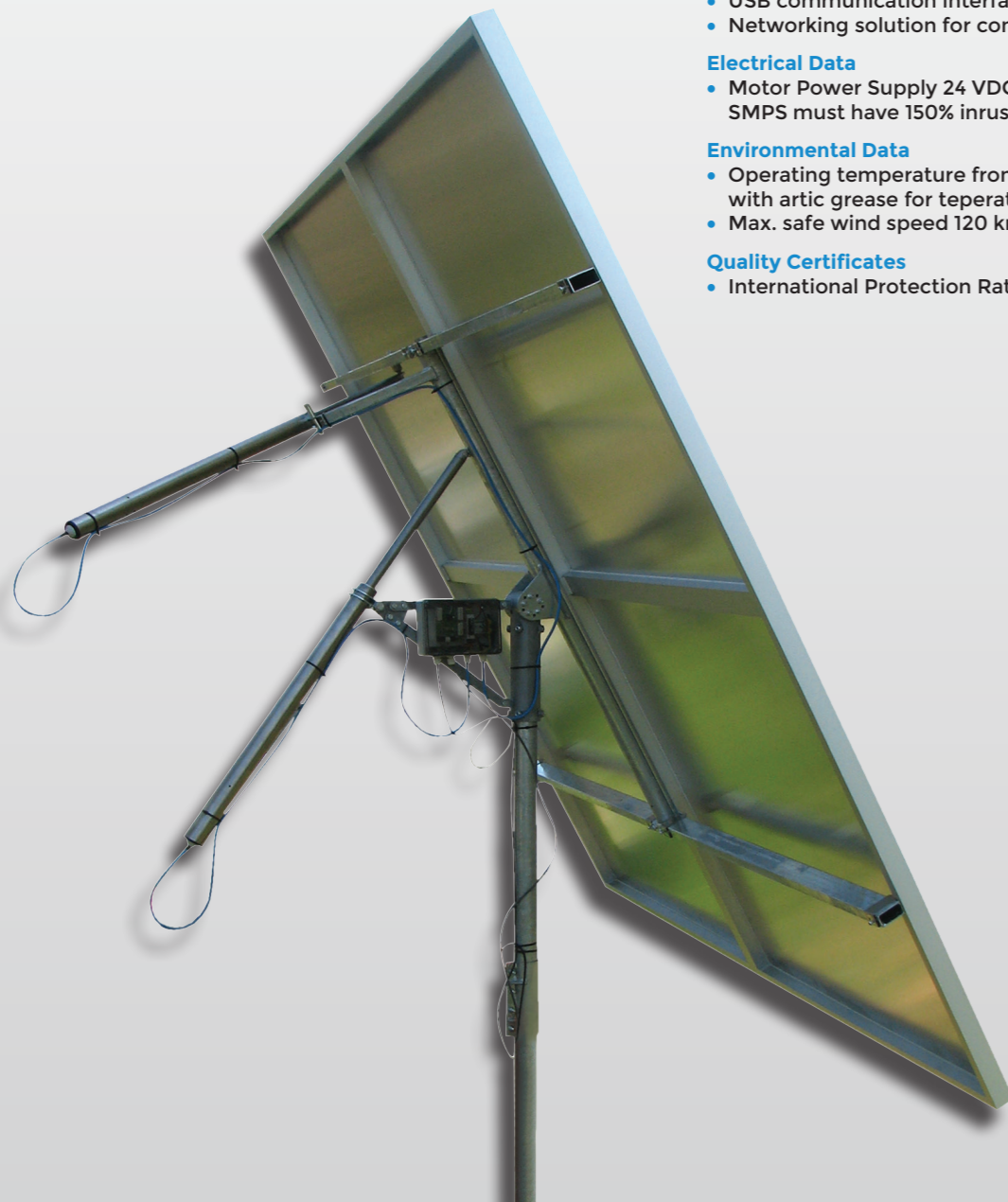
- Motor Power Supply 24 VDC ± 15% (2.5A current capacity)
- SMPS must have 150% inrush current

### Environmental Data

- Operating temperature from- 25°C to +70°C (optionally with artic grease for teperatures from -40°C up to +70°C)
- Max. safe wind speed 120 km/h

### Quality Certificates

- International Protection Rating (IEC 60529) IP63



More information visit



### Dual-Axis Heliostat for mirror application up to 3,1 m<sup>2</sup>

Code: 0122 - ST44M2HEL3M

- With time-derived astronomical positioning for the automatic sun-tracking
- Dual-Axis solar tracker with embedded positioner
- Time controlled astronomical algorithm for sun-tracking
- Simple installation and synchronization of sun time
- Usable for Heliostats, Tower Receiver CSP and Natural Daylighting System
- 13 hours of automatic tracking and sun mirroring
- User friendly interface for monitoring, setting and upgrading
- USB communication port, RS485
- For surface area up to 3,1 m<sup>2</sup> and max 90 kg
- Made in Europe

#### Mechanical Capabilities

- Dual-Axis
- Hour Angle Limit 100°, software and hard ware limit 50°E to 50°W
- Elevation angle 15-90°, adjustable start
- Hour-angle motor, Linear Motor SM4S520M2 with stroke of 520 mm
- Elevation-angle motor: Linear Motor SM4S520M2 with stroke of 520 mm
- 1 mirror panels, dimensions of 1.250 mm x 2.500 mm with net surface of 3,1 m<sup>2</sup>
- Max. weight of mirror panel, 30 kg/mirror

#### Positioning System Data

- Operating Protocol TdAPS (Time derived Astronomical Positioning System)
- GMT clock timer with EOT and calendar

#### Communication Data

- USB communication interface
- Networking solution for control from centre RS485

#### Electrical Data

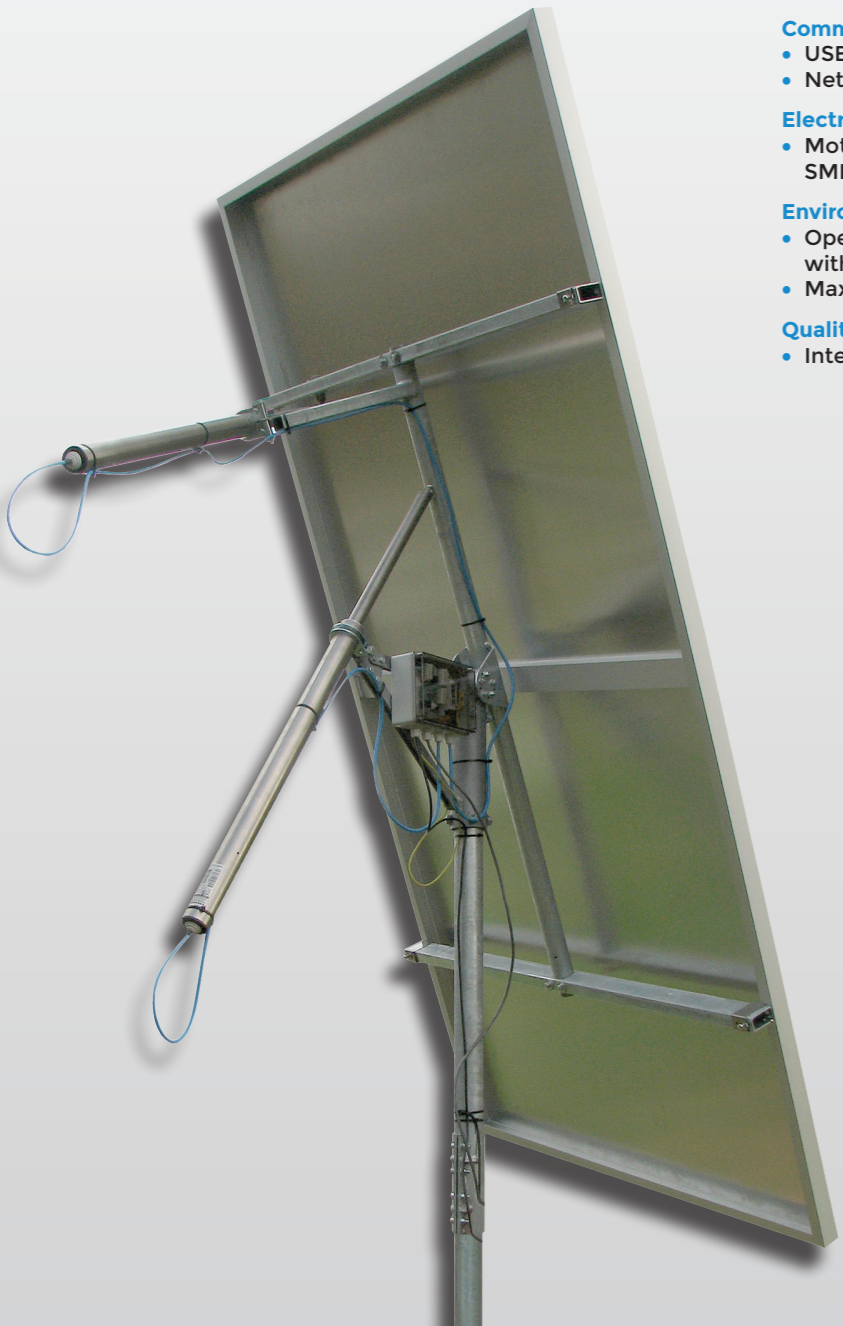
- Motor Power Supply 24 VDC ± 15% (2.5A current capacity)
- SMPS must have 150% inrush current

#### Environmental Data

- Operating temperature from- 25°C to +70°C (optionally with artic grease for teperatures from -40°C up to +70°C)
- Max. safe wind speed 120 km/h

#### Quality Certificates

- International Protection Rating (IEC 60529) IP63



More information visit

3. Solar linear motor - actuator

Series SM4 M2 - Mechanical Drawing

Series SM4 M2



Ordering information - coding explanation

SM4	S510	M2	NC
Series prefix	S - Stroke lenght	Motor type	Clamp type
SM4	S200-200 mm	M2 - brush DC motor	NC - no clamp
	S300-300 mm	M2B - brush less DC motor	C4 - clamp
	S450-450 mm		U8 - clamp
	S510-510 mm		

Model	EAN	Stroke	A closed	A open	Clamp type
SM4S200M2U8	0069	200 mm	48.5	348.5	U8
SM4S300M2U8	0068	300 mm	48.5	348.5	U8
SM4S400M2NC	0172	400 mm			no clamp
SM4S510M2NC	0077	510 mm			no clamp

Mechanical Capabilities

- Construction material of linear motor Stainless steel tubes and spindle and high carbon steel
- Spindle type and material ACME stainless spindle
- Stroke lenght  
SM4S300M2U8 - stroke 300 mm  
SM4S400M2NC - stroke 400 mm  
SM4S510M2NC - stroke 510 mm
- Max. static load 340 kgf
- Dynamic load capacity 220 kgf
- Rod end type Rod end type Rodend with groove 12 mm and hole dia. 10 mm
- Speed at no load 1,5 mm/s at no load
- Resolution 265,33 pulses/mm
- Backlash max 0,15 mm optionally possible less

Electrical Data

- Motor power supply 24VDC +/- 15% 2A (2,5A current capability) (In rush 300% on Max. current or softstart)\*
- Power consumption in operation Rated 36W at 20% duty cycle
- Electrical connections Typical 2x1 mm<sup>2</sup> + 5x0.22 mm<sup>2</sup> (Hole size on connector 1.5 mm<sup>2</sup>)

Environmental Data

- Operating temperature -25°C to +70°C (optionally with arctic grease for teperatures from -40°C up to +70°C)
- Operation at humidity 0% to 100%, relative humidity

Corrosion, weather and chemical resistance

- Corrosion Protection PLASOX® plasmanitriding with subsequent oxidation, corrosion resistant material Zn/Ni/ Ni 10 umm, rest stainless steel

Packaging

- Dimensions of a packed product 1box of 1000(L) x 80(W) x 60(H) mm
- Product weight (neto)  
SM4S300M2U8 - 3.5 kg  
SM4S400M2NC - 4.5 kg  
SM4S510M2NC - 4.94 kg

Quality Certificates

- International Protection Rating (IEC 60529) IP63
- Electromagnetic Compatibility (EMC Directive 89/336/EEC)
- Low Voltage Equipment Directive (EEC Council Directive 73/23/EEC)

Optional Properties

- Heliostat usage
- CPV usage (concentrated PV usage)
- Guarantee time 2 years as standard, 5 years for +20% \*\*\* 10 years for +35% \*\*\*

\* NOTE: Lifetime of the brush in the motor is 30% shorter if motors don't have soft start and stop  
\*\*\* NOTE: For additional payment

SM4S510M2NC Code: 0077



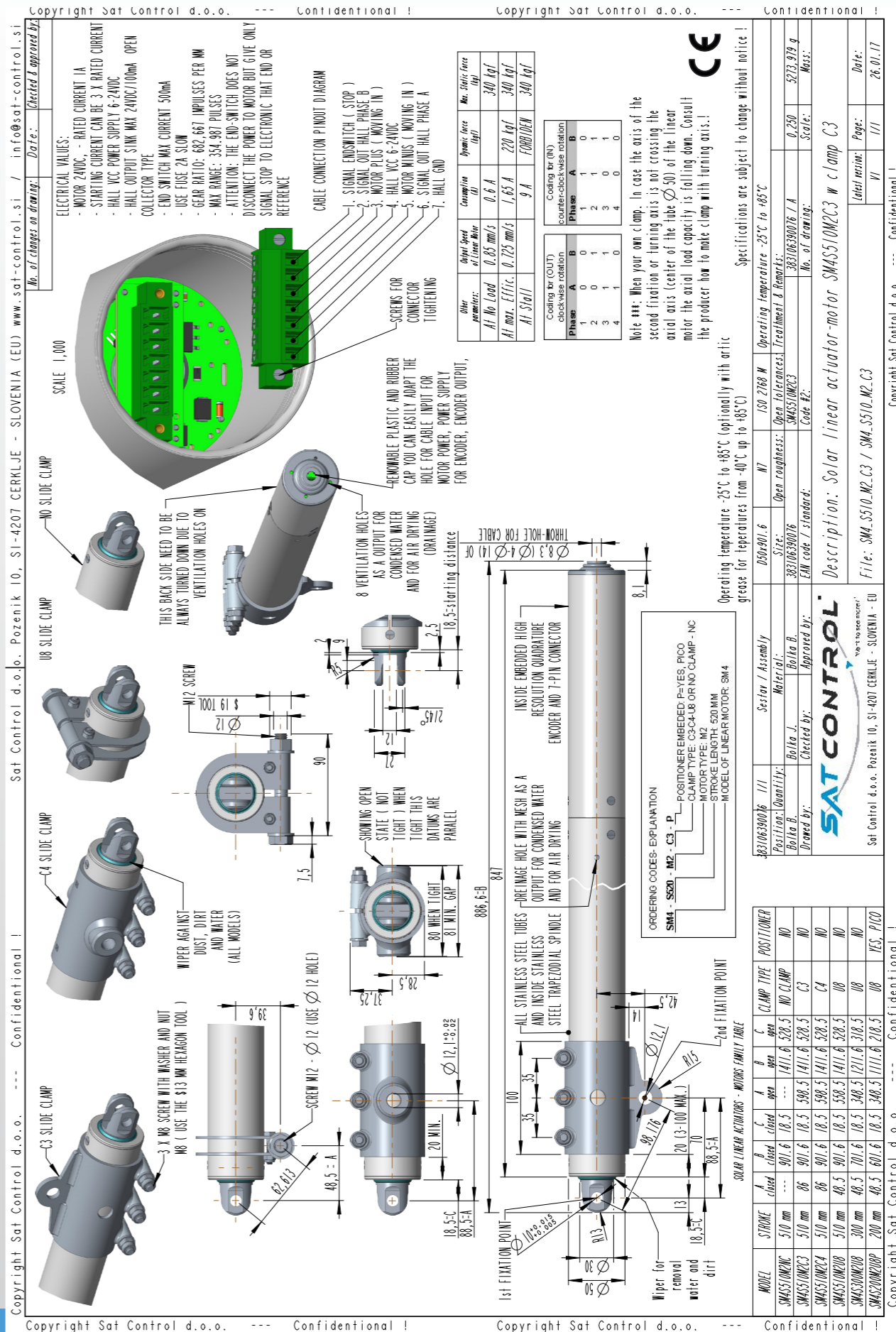
SM4S510M2C4 Code: 0175



SM4S510M2U8 Code: 0078



More information visit





3. Solar linear motor - actuator

Series SM4 M3 - Mechanical Drawing

Series SM4 M3



Ordering information - coding explanation

SM4	S900	M3	NC
Series prefix	S - Stroke lenght	Motor type	Clamp type
SM4	S200-200 mm S300-300 mm S450-450 mm S600-600 mm S700-700 mm S800-800 mm S900-900 mm	M3 - brush DC motor M3B - brush less DC motor	NC - no clamp C4 - clamp U8 - clamp

Model	EAN	Stroke	A	B	Clamp type
SM4S200M3C4	0101	200 mm	684	763,6	C4
SM4S300M3NC	0093	300 mm	784	863,6	no clamp
SM4S450M3C4	0085	450 mm	934	1013,6	C4
SM4S500M3NC	0075	500 mm	984	1063,6	no clamp
SM4S600M3NC	0092	600 mm	1084	1163,6	no clamp
SM4S600M3C4	0178	600 mm	1084	1163,6	C4
SM4S700M3NC	0181	700 mm	1184	1263,6	no clamp
SM4S700M3C4	0177	700 mm	1184	1263,6	C4
SM4S900M3NC	0094	900 mm	1384	1463,6	no clamp
SM4S900M3C4	0095	900 mm	1384	1463,6	C4

Mechanical Capabilities

- Construction material of linear motor Stainless steel tubes and spindle and high carbon steel
- Spindle type and material ACME stainless spindle
- Stroke lenght\*\*  
SM4S600M3NC - stroke 600 mm  
SM4S700M3NC - stroke 700 mm  
SM4S900M3C4 - stroke 900 mm
- Max. static load 1500 kgf
- Dynamic load capacity 800 kgf
- Rod end type Spherical bearing with hole dia. 12 mm with pivot angle of 13°
- Speed at no load 2,33 mm/s
- Resolution 188 pulses/mm
- Backlash max. 0,15 mm

Electrical Data

- Motor power supply 24VDC +/- 15% 4A (5A current capability) (In rush 300% on max. current or softstart)\*
- Power consumption in operation Rated 36W, max. 100W at 20% duty cycle
- Power supply connection 1 piece of 2 Wire Cable with an Internal Cu Conductor of 1,5 mm<sup>2</sup> (not included in kit)

Environmental Data

- Operating temperature -25°C to +85°C (optionally with arctic grease for temperatures from -40°C up to +85°C)

- Operation at humidity 0% to 100%, relative humidity
- Corrosion Protection, weather and chemical resistance PLASOX® plasmanitriding with subsequent oxidation

Packaging

- Dimensions of a packed product  
1 box of 1600 (L) x 80 (W) x 80 (H) mm
- Product weight neto  
SM4S600M3NC - 8,5 kg  
SM4S700M3NC - 8,5 kg  
SM4S900M3C4 - 8,5 kg

Quality Certificates

- International Protection Rating (IEC 60529) IP63
- Electromagnetic Compatibility (EMC Directive 89/336/EEC)
- Low Voltage Equipment Directive (EEC Council Directive 73/23/EEC)

Optional Properties

Guarantee time 2 years as standard, 5 years for +20% \*\*\* 10 years for +35% \*\*\*

\* NOTE: Lifetime of the brush in the motor is 30% shorter if motors don't have soft start and stop,  
\*\* NOTE: Other dimensions optionally  
\*\*\* NOTE: For additional payment

SM4S600M3NC Code: 0092

SM4S900M3C4 Code: 0095



More information visit

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**Electrical Values:**  
 - MOTOR 24VDC.  
 - RATED CURRENT: 1.5A  
 - MAX CURRENT: 4A  
 - STARTING / AT STALL CURRENT: 3-4 x MAX CURRENT  
 - DUTY CYCLE: 20% MAX 8 MINUTES OF OPERATING  
 - HALL VCC POWER SUPPLY 6-24VDC  
 - HALL OUTPUT SINK MAX 24VDC/100mA  
 - OPEN COLLECTOR TYPE  
 - END SWITCH MAX CURRENT 500mA

**ATTENTION:** THE ENDSWITCH DOES NOT DISCONNECT THE POWER TO MOTOR BUT GIVE ONLY SIGNAL STOP TO ELECTRONIC THAT END OR REFERENCE

**CABLE CONNECTION PINOUT DIAGRAM**  
 1. SIGNAL ENDSWITCH ( STOP )  
 2. SIGNAL OUT HALL PHASE 2 ( B )  
 3. MOTOR PLUS ( MOVING IN )  
 4. HALL VCC 6-24VDC  
 5. MOTOR MINUS ( MOVING IN )  
 6. SIGNAL OUT HALL PHASE 1 ( A )  
 7. HALL GND

**OTHER PARAMETERS**

Max. Static load	Max. Dynamic load	Rated load	Speed at no load	Gear Ratio	Backlash	Daily cycle
1500 kgf	800 kgf	200 kgf	2 mm/s	188 imp/mm	0,15 mm	20% max 8 minutes

**Hall sensor encoding**  
 - Coding per (10) counts encoder rotation  
 Phase: A B  
 1 0 0 1  
 2 0 1 1  
 3 1 1 0  
 4 1 0 0

**ORDERING CODES-EXPLANATION**  
 SM4 - S900 - M3 - NC - P  
 POSITIONER EMBEDDED P=YES, PICO CLAMP TYPE C3=C4=L8 OR NO CLAMP - NC MOTOR TYPE M2 STROKE LENGTH 520 MM MODEL OF LINEAR MOTOR SM4

**SOLAR LINEAR ACTUATORS - MOTORS FAMILY TABLE**

MODEL	EAN	STROKE	A	B	CLAMP TYPE
SM4S300M3NC	383106390094	300 mm	1384	1463,6	NO CLAMP
SM4S300M3C4	383106390095	300 mm	1384	1463,6	C4
SM4S600M3C4		600 mm	1084	1163,6	C4
SM4S450M3C4		450 mm	934	1013,6	C4
SM4S300M3C4		300 mm	784	863,6	C4
SM4S200M3C4		200 mm	684	763,6	C4

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4. Linear drives – slewing drives

Slewing drive SD5M3 – Mechanical Drawing

Slewing drive SD5M3

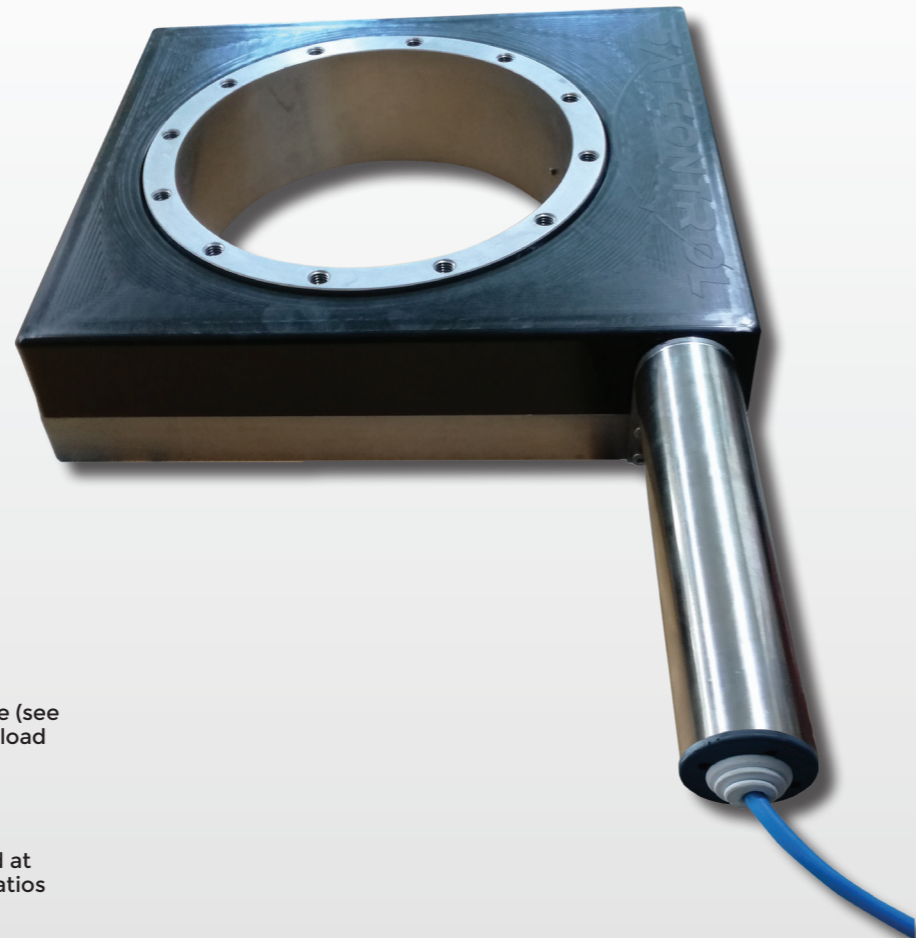
Code: 7400

Drive units for solar Sun-tracker systems

Solar power plants require robust drive systems with high accuracy, efficiency and virtually maintenance-free long-term operation showing a high degree of reliability.

Only components specially designed for outdoor use can meet the requirements. Worm gear units are ideally suited for the azimuth adjustment of a tracker, since they can be used for virtually backlash-free transmission ratios and very slow movements.

By target-oriented selection of defined materials, required parameters such as perfect wear behaviour, high fatigue strength and long-term corrosion protection are achieved and implemented.



Mechanical Capabilities

- Raceway diameter 280 mm ( 11 inch )
- Max. Static axial load 350 kN at 7 kNm of axial torque (see load diagram) or 120 kN at 20 kNm axial torque (see load diagram)
- Max. Static axial torque 20 kNm at 120 kN (see load diagram)
- Max. static radial load 15 kNm
- Max. dynamic radial load 600 Nm at I (mot) = 4A and at planetary gear head ratio 1 / 188,611 (different gear ratios and motor power provide different dynamic torque, another types of gearheads available on request)
- Backlash 0.03°-0.15° depend from client's demand (effect on price)
- Turning speed at no load 1.8 °/s
- Turning speed at load 0.9 °/s
- Gear ratio of Worm gear / Worm spindle 1 / 100
- Gear ratio of planetary gear motor 1 / 188.611( another gear ratios available on request)
- Heliostat usage Yes, backlash > 0.05°
- CPV usage (concentrated PV usage) Yes, backlash > 0.1°
- Slewing drive table size 350 x 380 x 93.5 mm
- Inner diameter of slewing drive 240 mm
- Diameter of screw ring at inner ring by slewing drive 260 mm
- Construction material High carbon steel, quenched / tempered, stainless steel tube
- Spindle type and material Worm wheel - high carbon steel quenched / tempered

Electrical Data

- Motor power supply 24VDC +20% / -10% (5A current capability)
- Power Tolerance +20% / -10%
- Power in operation Rated 36W, max.100W at 20% duty cycle
- Power in standby 0,1Wh / h (4mA at 24VDC)
- End switches 1endswitch embedded and functional when turning CCV
- Estimated service life Slewing drive 30.000 revolutions at full load, PMDC motor 1500 h of operation

- Hall signals 2, for quadrature encoder, shifted for 90°
- Resolution 0,00477° = 1 pulse, 209,5678 pulses/°
- Duty cycle 20% max. 8 minutes in operating continuously
- Electromagnetic Compatibility (EMC Directive 89/336/EEC) Yes
- Low Voltage Equipment Directive (EEC Council Directive 73/23/EEC) Yes

Corrosion, weather and chemical resistance

- Operating temperature -25°C to +85°C, optional with special arctic grease -40°C to +85°C
- Relative air humidity 0% to 100%, relative humidity
- Corrosion Protection Zn/Ni/Ni 12um (min 25 years corrosion resistance)
- International Protection Rating (IEC 60529) IP63, outdoor usage in harsh environment

Packaging

- Dimensions (W / H / D) in mm Packed product in wooden box of 700 (L) x 500 (W) x 300 (H) mm
- Weight 2 kg net, 50 kg with box

Guarantee conditions

- Guarantee time 2 years



More information visit

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Electrical Values:

- MOTOR 24VDC
- RATED CURRENT 1.5A
- MAX CURRENT 4A
- STARTING / AT STALL CURRENT: 3-4 x MAX CURRENT
- DUTY CYCLE: 20% MAX 8 MINUTES OF OPERATING
- HALL VCC POWER SUPPLY 6-24VDC
- HALL OUTPUT SINK MAX 24VDC/100mA
- OPEN COLLECTOR TYPE
- END SWITCH MAX CURRENT 500mA

ATTENTION: THE END SWITCH DOES NOT DISCONNECT THE POWER TO MOTOR BUT GIVE ONLY SIGNAL STOP TO ELECTRONIC THAT END OR REFERENCE

OTHER PARAMETERS

Motor diameter	280 mm
Max. static axial load	350 kN at 7 kNm of axial torque (see load diagram)
Max. static radial load	15 kNm
Max. dynamic radial load	600 Nm at I (mot) = 4A and at planetary gear head ratio 1 / 188,611 (different gear ratios and motor power provide different dynamic torque, another types of gearheads available on request)
Turning speed at no load	1.8 °/s
Turning speed at load	0.9 °/s
Gear ratio of Worm gear / Worm spindle	1 / 100
Gear ratio of planetary gear motor	1 / 188.611( another gear ratios available on request)
Heliostat usage	Yes, backlash > 0.05°
CPV usage (concentrated PV usage)	Yes, backlash > 0.1°
Slewing drive table size	350 x 380 x 93.5 mm
Inner diameter of slewing drive	240 mm
Diameter of screw ring at inner ring by slewing drive	260 mm
Construction material	High carbon steel, quenched / tempered, stainless steel tube
Spindle type and material	Worm wheel - high carbon steel quenched / tempered

ORDERING CODES EXPLANATION

SD5 - M3 - 250 - P - B1

PACKAGING CLASS B1 or B2 B3 B4 B5 B6 B7 or B7(2000)

POSITIONER EMBEDDED: P-VES, P-AO, EMPTY=NO

POWER RATIO: 50, 30, 25, 10, 5, 2, 1, 0.5, 0.25, 0.125, 0.0625, 0.03125, 0.015625

MODEL SD5 - RACEWAY DIAMETER 280 mm (11 inch)

Attention!

- THE SLEWING DRIVE COMES WITH NO OIL INSIDE, SO YOU HAVE TO FILL WITH 0.3L OF W688 OIL BEFORE OPERATING
- IP PROTECTION: IP63, outdoor usage in harsh environment
- PRODUCT PACKAGING - DIMENSIONS & WEIGHT:
  - WOODEN BOX DIM: 1 box of 700 (L) x 500 (W) x 300 (H) mm & 42 kg net, 50kg with wooden box

Dimensions (W / H / D) in mm Packed product in wooden box of 700 (L) x 500 (W) x 300 (H) mm

Weight 2 kg net, 50 kg with box

Guarantee time 2 years

Operating temperature -25°C to +85°C (optionally with arctic grease for temperatures from -40°C up to +85°C)

Specifications are subject to change without notice!

RECOMMENDED OIL: W688

GREASE NIPPLE (RECOMMENDED GREASE IS: ELF-EPEXA 2, SHELL CALITHIA FETT T2, MOBIL MOBILUX EP2)

OIL NIPPLE

THIS SIDE MUST BE ALWAYS TURNED DOWN AND HORIZONTALLY DUE TO OIL LEVEL AT BOTTOM COVER

DRE DRAINAGE HOLE AS AN OUTPUT FOR CONDENSED WATER

INSIDE EMBEDDED HIGH RESOLUTION QUADRATURE ENCODER AND 7-PIN CONNECTOR

REMOVABLE PLASTIC AND RUBBER CAP YOU CAN EASILY ADAPT THE HOLE FOR CABLE INPUT FOR MOTOR POWER, POWER SUPPLY FOR ENCODER, ENCODER OUTPUT.

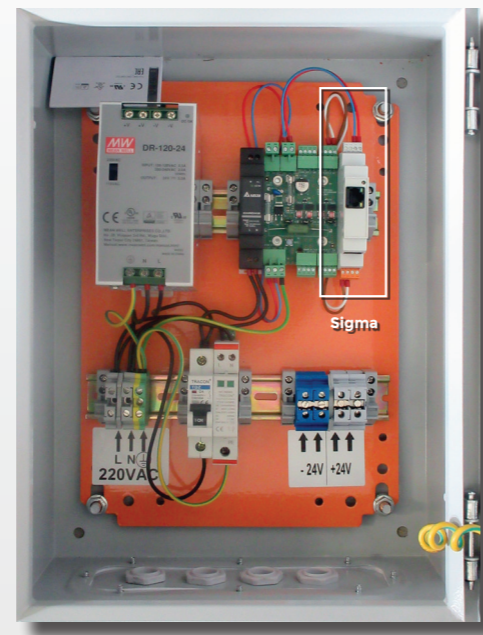
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## 5. Solar monitoring systems

## 5. Solar monitoring systems

## Sigma Solar Tracking Server

Code: 4105

**The standardized data interface for large-scale systems**

Large-scale plants and PV power utility stations require customized monitoring solutions and need to link systems and components into one joint control system. Sigma Server set new communication standard in the field of automation technology, that enables simple and reliable data exchange between products and applications. With the Sigma Solar Server, Sat Control equipment can be very easily integrated into compatible systems.

**Overview****Professional**

- Visualization, control and monitoring of large-scale plants
- Integration of Sat Control equipment into existing control-room technology

**Flexible**

- Data interface in accordance with the communication standards in the field of automation technology
- Simple and fast installation, high reliability

**Technical Capabilities****Communication**

- Communication with Enigma Analytics Ethernet
- PC communication Ethernet
- Tracker communication RS485

**Interfaces**

- Analog and digital inputs 3 digital inputs
- Ethernet 10/100 Mbit, RJ45
- RS485 3 Pin Connector

**Max. number of controlled devices**

- Solar Tracker 64 (Dual Axis) or 128 (Single Axis)

**Max. communication range**

- Ethernet 100 m, RS485 1000 m

**Power supply**

- Power supply External Power Supply
- Input voltage 12-24VDC
- Power consumption Type 4 W / max. 12 W

**Environmental conditions in operation**

- Ambient temperature -20°C ... +45°C
- Relative air humidity 0% ... 45%, non-condensing

**Memory**

- Internal 0,5 MB, External SD card 2 GB

**General data**

- Dimensions (W / H / D) in mm 110 / 55 / 17
- Weight 100 g
- Mounting location Indoors
- Mounting options DIN rail mounting
- Status display LEDs

**Languages**

- Software language English
- Language versions - manual English

**Features**

- Operation Integrated Web server (Internet browser)
- Warranty 2 years\*
- Certificates and approvals www.solar-motors.com

\* Optionally 5 or 10 years for additional payment.

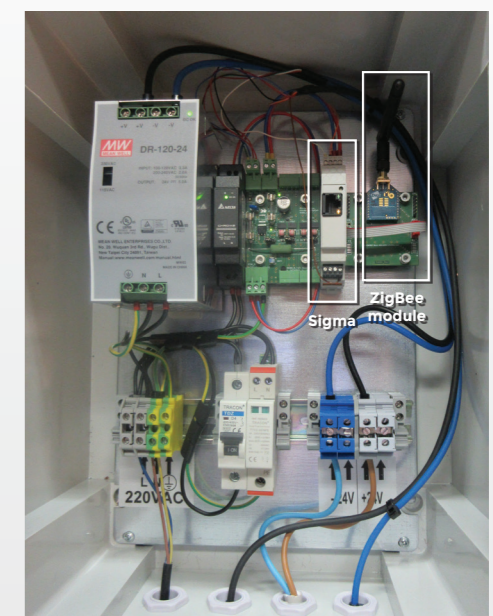


More information visit

www.solar-motors.com

## Sigma Solar Tracking Server with ZigBee mesh network

Code: 4128

**The standardized data interface for large-scale systems**

Large-scale plants and PV power utility stations require customized monitoring solutions and need to link systems and components into one joint control system. Sigma Server set new communication standard in the field of automation technology, that enables simple and reliable data exchange between products and applications. With the Sigma Solar Server, Sat Control equipment can be very easily integrated into compatible systems.

**Overview****Professional**

- Visualization, control and monitoring of large-scale plants
- Integration of Sat Control equipment into existing control-room technology

**Flexible**

- Data interface in accordance with the communication standards in the field of automation technology
- Simple and fast installation, high reliability
- ZigBee Wireless mash network, easy installation which mean no communication cables for installation on ground.
- Less chances of spreading damages due to lightning strike.

**Technical Capabilities****Communication**

- Communication with Enigma Analytics Ethernet
- PC communication Ethernet
- Tracker communication RS485 Wireless with ZigBee module
- Wireless communication protocol IEEE® 802.15.4 • • OEM RF Modules by MaxStream

**Interfaces**

- Analog and digital inputs 3 digital inputs
- Ethernet 10/100 Mbit, RJ45
- RS485 3 Pin Connector

**Max. number of controlled devices**

- Solar Tracker 48 (Dual Axis) or 96 (Single Axis)

**Max. communication range**

- Wireless mash network 150 m on open field

**Power supply**

- Power supply External Power Supply
- Input voltage 12-24VDC
- Power consumption Type 4 W / max. 12 W

**Environmental conditions in operation**

- Ambient temperature -20°C ... +45°C
- Relative air humidity 0% ... 45%, non-condensing

**Memory**

- Internal 0,5 MB, External SD card 2 GB

**General data**

- Dimensions (W / H / D) in mm 110 / 55 / 17
- Weight 100 g
- Mounting location Indoors
- Mounting options DIN rail mounting
- Status display LEDs

**Languages**

- Software language English
- Language versions - manual English

**Features**

- Operation Integrated Web server (Internet browser)
- Warranty 2 years\*
- Certificates and approvals www.solar-motors.com

\* Optionally 5 or 10 years for additional payment.

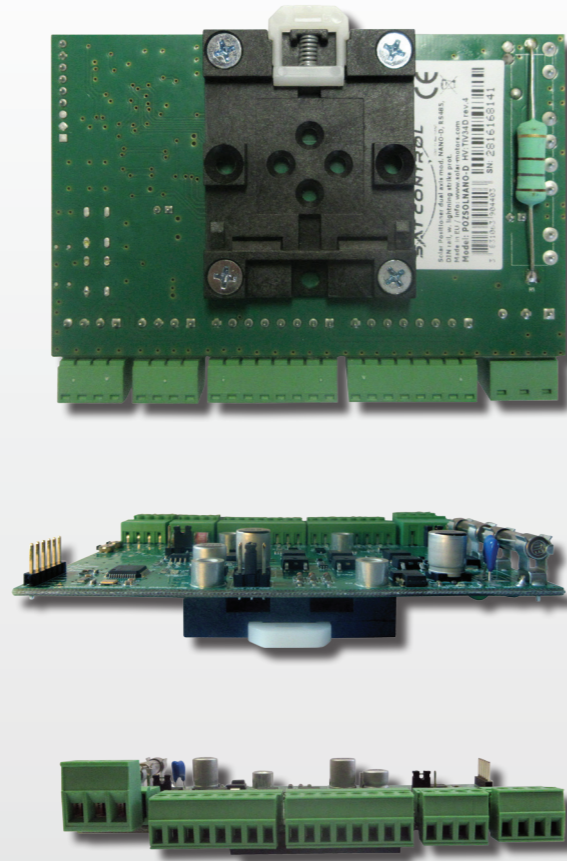
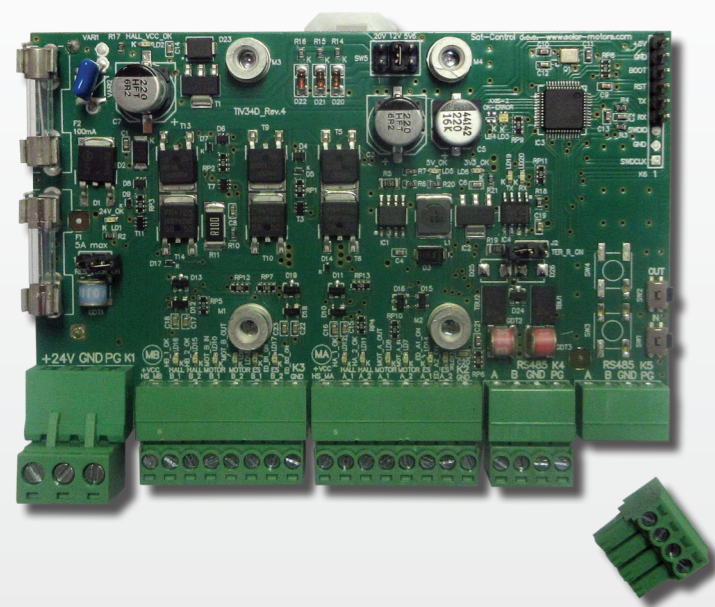


More information visit

www.solar-motors.com

### Solar positioner NANO-D

Code: 0440



#### Solar Positioner NANO-D for Single or Dual Axis Tracking

The dual axis Solar Positioner NANO-D set a new Positioning Accuracy Standard with RS485 communication, easy installation, safe operation and a simplified assembly concept: the new generation of positioners is ideally suited in middle-sized and large on-grid solar power plants. With the Sigma Server, Solar Positioner NANO-D creates complete, integrated system for monitoring, diagnosis and configuration of the PV plant.

#### Overview

- Professional**
- Drive and positioning of Single or Dual Axis Solar Trackers
  - Integration of Sat Control equipment into existing control-room technology
- Flexible**
- Data interface in accordance with the MODBUS communication standards in the field of automation technology
  - Simple and fast installation, high reliability
- Reliable**
- Direct communication with the Sigma Solar Server via RS485 Service Interface
  - Meets the requirements of the EU Low-Voltage Directive for grid safety management

#### Technical Capabilities

- Operation**
- Geometrical Operation Single / Dual Axis Positioner
  - Type Slave Positioner

#### Communication

- Positioner communication RS485 MODBUS

#### Interfaces

- Max. number of controlled devices 2 (Motors or Slewing drives)

#### Max. communication range

- RS485 cable distance 750 mm (twisted pair @ 0,5mm pair wire)

#### Power supply

- Power supply External SMPS type
- Input voltage 24VDC +/-15%
- Power consumption in idle 1.5 W

#### Environmental conditions in operation

- Ambient temperature -30°C ... +80°C
- Relative air humidity 0% ... 85%, non-condensing

#### General data

- Dimensions (L / W / H) in mm 112 / 30 / 80
- Weight 73 g
- For indoor usage
- DIN rail mounting
- Status display LEDs for; power (4), com. (2), ES (4), •• HS (4), Out (4), ERR (2)
- Hall signals 2 Hall signals per Axis, 90° shifted (quadrature encoder)
- End switches 2 Switches per Axis (one required, one optional)
- Manual buttons 2 (East-West, Reference)
- Upgrading In the field via RS485 MODBUS via Sigma

#### Languages

- Software language English
- Language versions - manual English

#### Features

- Warranty 2 years\*
- Certificates and approvals [www.solar-motors.com](http://www.solar-motors.com)
- Life Time Min. 10 years; typical 20 years

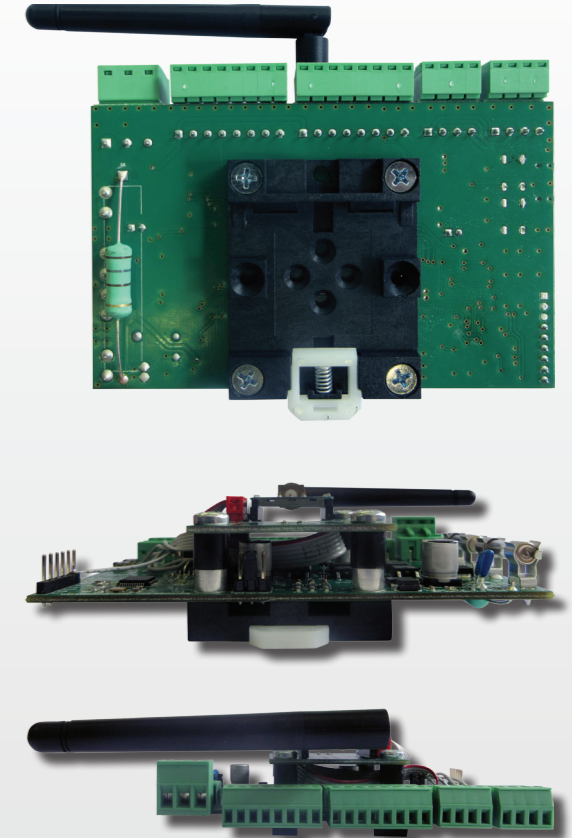
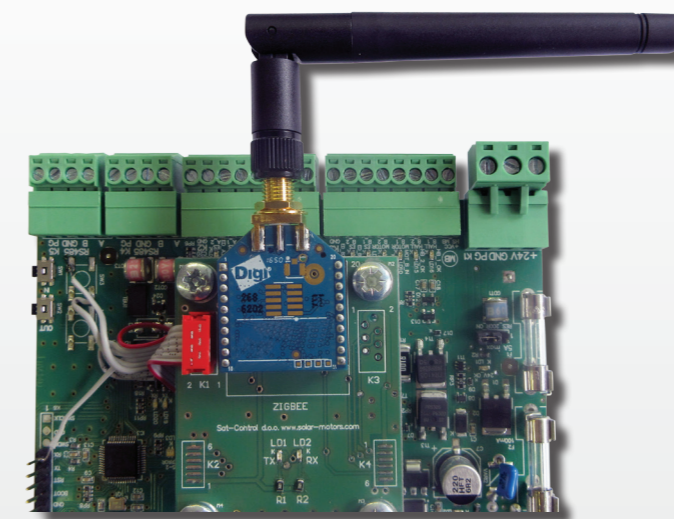
\* Optionally 5 or 10 years for additional payment.



More information visit

### Solar Positioner NANO-D w ZigBee, DIN rail

Code: 0442



#### Solar Positioner NANO-D for Single or Dual Axis Tracking

The dual axis Solar Positioner NANO-D set a new Positioning Accuracy Standard with RS485 communication, easy installation, safe operation and a simplified assembly concept: the new generation of positioners is ideally suited in middle-sized and large on-grid solar power plants. With the Sigma Server, Solar Positioner NANO-D creates complete, integrated system for monitoring, diagnosis and configuration of the PV plant.

#### Overview

- Professional**
- Drive and positioning of Single or Dual Axis Solar Trackers
  - Integration of Sat Control equipment into existing control-room technology
- Flexible**
- Data interface in accordance with the MODBUS communication standards in the field of automation technology
  - Simple and fast installation, high reliability
- Reliable**
- Direct communication with the Sigma Solar Server via RS485 Service Interface
  - Meets the requirements of the EU Low-Voltage Directive for grid safety management
  - ZigBee Wireless mesh network, easy installation which mean no communication cables for installation on ground.
  - Less chances of spreading damages due to lightning strike.

#### Technical Capabilities

- Operation**
- Geometrical Operation Single / Dual Axis Positioner
  - Type Slave Positioner

#### Communication

- Positioner communication Serial MODBUS Wireless mesh network with ZigBee module
- Wireless communication protocol IEEE® 802.15.4 OEM RF Modules by MaxStream

#### Interfaces

- Max. number of controlled devices 2 (Motors or Slewing drives)

#### Max. communication range

- Wireless mesh network 150 m on open field

#### Power supply

- Power supply External SMPS type
- Input voltage 24VDC +/- 15%
- Power consumption in idle 1.5 W

#### Environmental conditions in operation

- Ambient temperature -30°C ... +80°C
- Relative air humidity 0% ... 85%, non-condensing

#### General data

- Dimensions (L / W / H) in mm 112 / 30 / 80
- Weight 73 g
- For indoor usage
- DIN rail mounting
- Status display LEDs for; power (4), com. (2)+ ZigBee (2), ES (4), HS (4), Out (4), ERR (2)
- Hall signals 2 Hall signals per Axis, 90° shifted (quadrature encoder)
- End switches 2 Switches per Axis (one required, one optional)
- Manual buttons 2 (East-West, Reference)
- Upgrading In the field via Sigma trugh Wireless mesh network with ZigBee module

#### Languages

- Software language English
- Language versions - manual English

#### Features

- Warranty 2 years\*
- Certificates and approvals [www.solar-motors.com](http://www.solar-motors.com)
- Life Time Min. 10 years; typical 20 years

\* Optionally 5 or 10 years for additional payment.



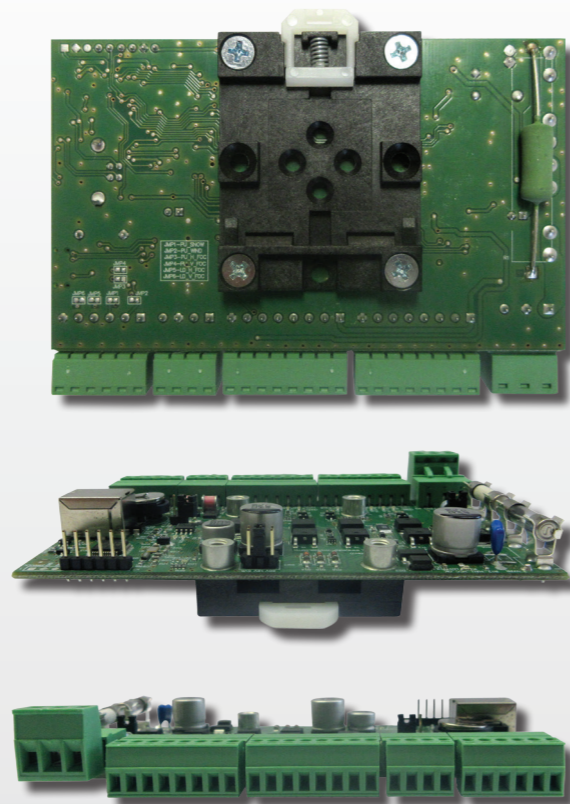
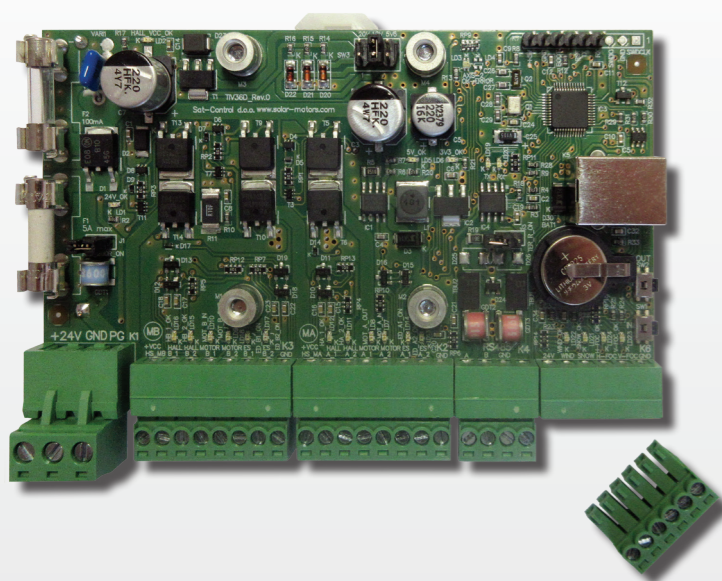
More information visit

6. Solar positioner

7. Monitoring system

Solar positioner MICRO-D

Code: 0441



Solar Positioner MICRO-D for Single or Dual Axis Tracking

With even better communication, usability and accuracy, the Solar Positioner MICRO-D set a new Positioning Accuracy Standards. With easy installation, safe operation, a simplified assembly concept, USB 2.0 tracker and RS485 plant communication: the new generation of positioners is ideally suited in single and middle size stand-alone grids.

Overview

Professional

- Drive and positioning of Single or Dual Axis Solar Trackers
- Integration of Sat Control equipment into existing control-room technology

Flexible

- Data interface in accordance with the communication standards in the field of automation technology
- Simple and fast installation, high reliability

Reliable

- Direct communication with Helios Analytics
- Meets the requirements of the EU Low-Voltage Directive for grid safety management

Technical Capabilities

Operation

- Geometrical Operation Single or Dual Axis Positioner
- Type Stand alone Positioner

Communication

- Positioner communication Primary - USB-B2.0, secondary - RS485 MODBUS

Engine

- Max. number of controlled devices For Max. 2 Linear Motors or Slewing drives

Max. communication range

- RS485 750 m twisted pair @ 0.5mm pair wire

Power supply

- Power supply External SMPS type

- Input voltage 24VDC +/- 15%
- Power consumption in idle 1,5 W

Environmental conditions in operation

- Ambient temperature -25°C ... +70°C
- Relative air humidity 0% ... 85%, non-condensing

General data

- Dimensions (W / H / D) in mm 116 / 30 / 80
- Weight 81 g
- Mounting location Indoors
- Mounting options DIN rail mounting
- Status display LEDs for power 4, com. (2), ES(4), HS (4), Out (4), ERR (2)
- Hall signals 2 Hall signals per Axis; 90° shifted (quadrature encoder)
- End switches 2 Switches per Axis (one required, one optional)
- Manual buttons 2 (East-West, Reference)
- Inputs for sensors Wind, Sun, 2x optical Sun
- Manual buttons 2 (East-West, Reference)
- Upgrading In The Field via USB

Languages

- Software language English
- Language versions - manual English

Features

- Warranty 2 years\*
- Certificates and approvals www.solar-motors.com
- Life Time Min. 10 years; typical 20 years; Int. battery 3 years

\* Optionally 5 or 10 years for additional payment.



More information visit

Helios Analytics Monitoring program

Professional management, monitoring and presentation of solar tracker

Helios Analytics program is highperformance communication hub for single- to small-scale of solar trackers. It continuously display all the data from the solar trackers on the system side, thereby keeping you informed of the system's status at any given time. The Helios Analytics is a multi-functional, energy-efficient data system which offers importing and exporting settings data for solar trackers.

Overview

Safe

- Remote monitoring, diagnosis and configuration of the solar trackers
- Quick detection of malfunctions and notification in case of a failure
- Powerful data system for importing and exporting all trackers setting data

User-friendly

- Central administration of all customer and tracker data
- Easy remote access via PC
- Easy to understand reporting

The program is designed to edit and display the settings on the trackers.

The program is not required for the daily operation of the tracker.

Technical Capabilities

Languages

- Software language, English, German, French, Japanese
- Language versions - manual, English

System requirements

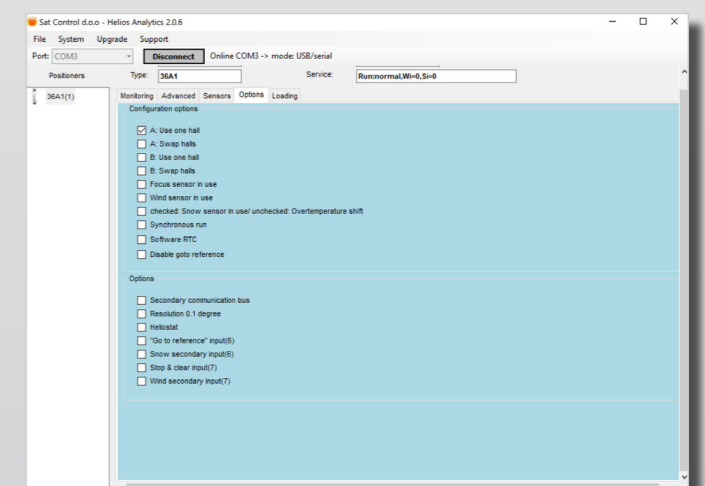
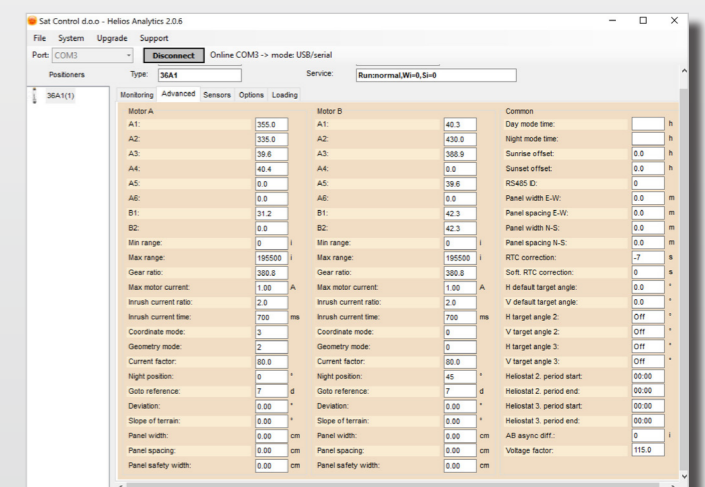
- Supported operating systems, Windows XP - Windows Vista, Windows 7, 8, 10
- Tracker communication - USB 2.0, RS 485 via RS485 to USB-adapter

Software

- Type, Exe file with libraries in Zip package

Information displayed

- Tracker status, tracker failures, tracker parameters, configuration settings



7. Monitoring system

7. Monitoring system

### Sigma Solar Tracking Server web page

Sigma Solar Tracking Server is the standardized data interface for large-scale systems. It enables customized monitoring solutions and linking systems and components into one joint control system. Sigma Server set new communication standard in the field of automation technology, that enables simple and reliable data exchange between products and applications. With the Sigma Solar Server, Sat Control equipment can be very easily integrated into compatible systems.

- Reliable RS485 communication bus for controlling slaves, at maximum length up to 1 km or ZigBee communication with distance up to 100m between modules.
- User interface made as Web page, accessible via Ethernet, internet, no special program required.
- Accurate astronomical calculation.
- The graphical view of the movements for trackers.
- Including different geometries for different trackers.
- Management configuration of trackers.
- Connection for many external weather sensors.
- Self upgrading.
- Easy and fast replacing, plug-in connection.

**General**

Solar radiation [W/m<sup>2</sup>]: 0 | Wind [km/h]: 0.0 | Temperature [°C]: 0.0 | Trackers mode: TRACKING OK

**Trackers**

NTP status: Synced 25/10/2017 07:09:31 GMT  
 SMTP status: Waiting  
 Weather station: Disabled  
 GMT Time: 25/10/2017 07:11:42  
 Solar time + MI\*: 25/10/2017 08:10:43  
 Solar sunrise time: 06:25:03 (Local: 06:33:01)  
 Solar sunset time: 17:02:19 (Local: 16:58:17)  
 Licenses information: 21 - Permanent

Sigma's voltage:	23.5	V
Sum of currents:	0.000	A
AE azimuth:	-54.09	°
AE elevation:	14.61	°
PM hour angle:	-51.63	°
PM elevation:	23.86	°

Channel	Angle [°]	Position [mm/°]
Channel A:	-51.63	2.0
Channel B:	23.86	438.4
Channel C:	-51.63	2.0
Channel D:	23.86	817.4
Channel E:	-54.09	75.9
Channel F:	14.61	807.0
Channel G:	14.61	5.0
Channel H:	-51.63	2.0

Winter mode: Off | On  
 Wind mode: Normal | Forced  
 Snow mode: Normal | Forced  
 Cleaning mode: Off | On

**User parameters**

Longitude: 14.5081 | Latitude: 46.2534  
 Sunrise offset [day mode] [h]: 0.1 | Sunset offset [night mode] [h]: 0.1  
 Heliostat ref. target azimuth [°]: 0.0000 | Heliostat ref. target elevation [°]: 0.0000  
 Homing interval MA [days]: 30 | Homing interval MB [days]: 30  
 Moving interval [M1] [s]: 60 | U supply factor [V/V]: 1.0000

**Power Supply parameters**

Power Supply Line: 1 | Max output current [A]: 10.0

**Installer parameters and tracking geometry**

Channels	Channel A	Name	Hour Angle ST44M1VP
A1 [mm / °]:	395.00	Coordinate mode:	3
A2 [mm / °]:	395.00	Geometry mode:	2
A3 [mm / °]:	39.50	Motor max range [mm / °]:	510.00
A4 [mm / °]:	40.40	Motor min range [mm / °]:	0.00
A5 [mm / °]:	0.00	Night position [°]:	0.00
A6 [mm / °]:	0.00	Wind position [°]:	0.00
B1 [mm / °]:	31.20	Diffuse position [°]:	0.00
B2 [mm / °]:	0.00	Cleaning position [°]:	0.00
Winter min range [mm / °]:	0.00	Winter max range [mm / °]:	0.00
Panel width [cm]:	0.00	Snow position [°]:	0.00
Panel safety width [cm]:	0.00	Panel pitch [cm]:	0.00
Fixed Deviation [°]:	0.00	Slope of the terrain 1 [°]:	0.00
Slope of the terrain 2 [°]:	0.00	Reserved:	

**Wind parameters**

Enable wind sensor:  | Enable wind mode:   
 Impulsed input:  | Fall time [min]: 60  
 Threshold [km/h]: 50 | Measuring coefficient: [(km/h)/V or (km/h)/Hz]: 19.8000

**Radiation parameters**

Enable radiation sensor:  | Enable diffuse mode:   
 Radiation coefficient [W/m<sup>2</sup>/V]: 130.0000 | Reserved: ...  
 Diffuse start time [hh:mm]: 0500 | Diffuse stop time [hh:mm]: 0900  
 Diffuse trigger [W/m<sup>2</sup>]: 0.0000 | Diffuse hyst [W/m<sup>2</sup>]: 200.0000  
 Low radiation timeout [min]: 5 | High radiation timeout [min]: 15

**Temperature parameters**

Enable temperature sensor:   
 Temperature coefficient [°C/V]: 11.0000 | Temperature offset [°C]: -30.0000

**Weather Station**

Weather data transmission mode: Disabled (local) | Remote station IP: 0.0.0.0

**Monitoring**

Wind speed [km/h]: 0.0  
 Solar radiation [W/m<sup>2</sup>]: 0  
 Temperature [°C]: 0.0

**System parameters**

IP address: 10.195.195.11 | Netmask: 255.255.255.0  
 Gateway: 10.195.195.1 | MAC address: 000A79F0D33E

**ZigBee**

PAN ID: 0000000000000556 | Set coordinator | Node discovery  
 Operating 16-bit PAN ID: channel: 8095; DE (0000000000000556) | Store current network  
 MAC address: 0013A200410675F7 (coordinator) | Set router | Set endpoint

**Licenses management**

Export licenses: Nr: | Target SN: | Export  
 Import licenses: Key: | Import

**Registration code**

Get code | Send to Sat-Control | confirm

**Updating parameters**

Server IP address: 86.61.66.230 | Server port: 80  
 Update path: /SIG\_FW/SIG\_TRA/ZBPV | Update interval [min]: 30  
 Update start time [hh:mm]: 0000 | Update end time [hh:mm]: 0400

**Email reporting**

SMTP IP address: 86.61.66.230 | SMTP port: 25  
 User name: Scanner | Password: \*\*\*\*\*  
 Email from: sigma@solar-motors.com | Email to 1: j.ajtopi@sat-control.si  
 Project Name: Sigma Sat Control | Email to 2:  
 OK report time [hh:mm]: 2305 | Error check interval [min]: 15  
 State: Waiting | Last error response:

**Input function select**

ADC2 function: Radiation sensor | ADC3 function: Temperature sensor

**RS485 parameters**

Primary Port [0,1]: 0 | Reserved: -

**Time parameters**

GMT Time [hh:mm:ss]: 072019 | Set | Reset time [hh:mm]: 0000  
 Date [dd/mm/yyyy]: 25102017 | Set | Time zone [h]: 1.0  
 NTP Server: 89.212.75.6 | NTP Port: 123  
 NTP update [min]: 30 | NTP State: Synced 25/10/2017 07:09:31 GMT

**User Interface**

Page Refresh Delay [s]: 1 | Reserved: -

**Files**

Show log | Date [ymdd]: | Prebrskaj | Datoteka ni izbrana. | Upload file

**Contact information**

Company: SAT CONTROL d.o.o.  
 Address: POZENK-10, 4207 CERKLE SLOVENIA  
 Latitude: 45  
 Longitude: 14  
 Phone 1: 084-1668758  
 Phone 2: www.solar-motors.com  
 Contact person: BOGDAN BOLKA  
 Contact email: bogdan@sat-control.si

**Positioner**

Positioner device ID: 1 | Send

**ZigBee**

MAC address: 0013A200410673AD (router) | Set | Set configuration | Router/Endpoint | Disconnect  
 Change PAN ID (Careful!): | Set | 16-bit network address: 5213 | Parent: FFEE  
 Routing order (from tracker): | Set | Enable aggregate routing notification:

**Positioner's parameters**

Motor A (MA)	100839452	Software version:	6.005
Serial number:	100839452	Modbus Port [0,1]:	0
CRC Errors, Checksum Errors:	1, 0	Max Power line resistance [ohm]:	0.56   Send
Power line resistance [ohm]:	0.00	Motor min range MA [mm or °]:	0.00   Send
Motor min range MA [mm or °]:	0.00	Motor min range MB [mm or °]:	0.00   Send
Motor max range MA [mm or °]:	600.00   Send	Motor max range MB [mm or °]:	600.00   Send
Motor home offset MA [mm or °]:	0.00   Send	Motor home offset MB [mm or °]:	0.00   Send
Gear ratio MA [mp / mm or °]:	199.02   Send	Gear ratio MB [mp / mm or °]:	199.02   Send
Modbus timeout pos. MA [mm or °]:	450.00   Send	Modbus timeout pos. MB [mm or °]:	450.00   Send
Current limitation of MA [A]:	2.50   Send	Current limitation of MB [A]:	2.50   Send
Motor inrush current ratio MA:	3.00   Send	Motor inrush current ratio MB:	3.00   Send
Motor stop time MA [ms]:	700.00   Send	Motor stop time MB [ms]:	700.00   Send
Motor stop time MA [ms]:	400.00   Send	Motor stop time MB [ms]:	400.00   Send
Detection current MA [A]:	0.25   Send	Detection current MB [A]:	0.25   Send
End switch error detect MA [mm]:	10.00   Send	End switch error detect MB [mm]:	10.00   Send
Voltage measuring factor:	28.00   Send	Current measuring factor:	28.00   Send
Modbus timeout (sec):	3600   Send	Modbus timeout ID delay [sec]:	60   Send
Homing timeout (sec):	1800   Send	Change slave ID (careful!):	Send
Swap direction of encoder count. MA:	<input type="checkbox"/>	Swap direction of encoder count. MB:	<input type="checkbox"/>
Swap direction of rotation MA:	<input type="checkbox"/>	Swap direction of rotation MB:	<input type="checkbox"/>
Used halls of MA:	Both	Used halls of MB:	Both

**Power**

Power Supply Line: 1 | Set Range: | Send

**Channels**

Motor A(MA) is linked to: Channel C | Send to all | Send  
 Motor B(MB) is linked to: Channel D | Send to all | Send

**Test mode**

No. of cycles A(MA): | Send | Send to all | End position A(MA): 0.00 | Set | Stop testing  
 No. of cycles B(MB): | Send | Send to all | End position B(MB): 0.00 | Set | Stop testing  
 Current limit detection: 0.0000 | Set

**Manual mode**

Destination A(MA) [mm]: | Send | Tracking enable/disable | Clear status | Reset Tracker  
 Destination B(MB) [mm]: | Send | Home MA | Home MB | Stop motor | Go home all | Measure Res. all

**Monitoring**

ID: | Version: | Boot: | Force: | Show remaining counter: | Clear status range: | Enable all | Disable all

ID	bVer	Ver	Line	U [V]	I [A]	MA Rem. [mm]	MA Pos. [mm]	MA Dest. [mm]	MA Ch.	MB Rem. [mm]	MB Pos. [mm]	MB Dest. [mm]	MB Ch.	Wait [s]	S	M	H	T
01	6.005	6.005	1	24.0	0.000	-3.8	2.0	2.0	C	-0.1	809.2	809.2	D	42	1			
02	6.005	6.005	2	24.1	0.000	0.2	2.0	2.0	A	0.2	433.8	433.8	B	44	2			
03	6.005	6.005	3	24.1	0.000	2.0	2.0	2.0	C	0.0	255.1	255.1	0	42	3			
04	6.005	6.005	3	24.0	0.000	0.0	2.0	2.0	C	0.0	600.0	600.0	D	51	4			
05	6.005	6.005	3	24.0	0.000	0.0	2.4	2.4	C	0.0	600.0	600.0	D	54	5			
06	6.005	6.005	3	23.9	0.000	0.0	2.5	2.5	C	-0.2	600.0	600.0	D	56	6			
07	6.005	6.005	3	24.2	0.000	-0.1	2.6	2.6	C	0.1	600.0	600.0	D	59	7			
08	6.005	6.005	2	24.1	0.000	-0.1	2.0	2.0	A	0.0	433.8	433.8	B	52	0			
09	6.005	6.005	2	24.2	0.000	-0.0	5.0	5.0	G	-0.0	0.0	0.0	0	55	7			
10	6.005	6.005	2	24.3	0.000	-0.7	109.3	109.3	E	0.0	801.6	801.6	F	57	10			

## 8. Ground screw

## 8. Ground screw

**Ground screw: D = 76 mm x L = 1.4 m  
with tube D = 63,5 mm x 4 mm x L= 2 m**

Code: 1310

**General group of features included in product:**

SET Ground scr. D = 76 mm x L= 1.4 m with tube D = 63,5 mm x L= 2 m

**Length of ground screw:**

D= 76,1 mm x 3 mm x L= 1.4 m

**Max. diameter of tube you can put in:**

D = 63,5 mm x 4 mm L= 2 m

**Surface treatment protection type and thick:**

Hot bath zincking Zn 200 um EN ISO1461

**Outside diameter of ground screw:**

D = 63,5 mm x 4 mm x L= 1.4 m

**Screw thread length:**

D = 105 mm L= 540 mm



More information visit

www.solar-motors.com

**Ground screw: D = 76mm x L = 1.4m  
with tube D = 63,5 mm x 4 mm x L= 3 m**

Code: 1312

**General group of features included in product:**

SET Ground scr. D = 76mm x L= 1.4 m with tube D = 63,5 mm x L= 3 m

**Length of ground screw:**

D = 76,1 mm x 3 mm x L= 1.4 m

**Max. diameter of tube you can put in:**

D = 63,5 mm x 4 mm L= 3 m

**Surface treatment protection type and thick:**

Hot bath zincking Zn 200 um EN ISO1461

**Outside diameter of ground screw:**

D = 63,5mm x 4mm x L= 2.4 m

**Screw thread length:**

D = 105mm L= 540 mm

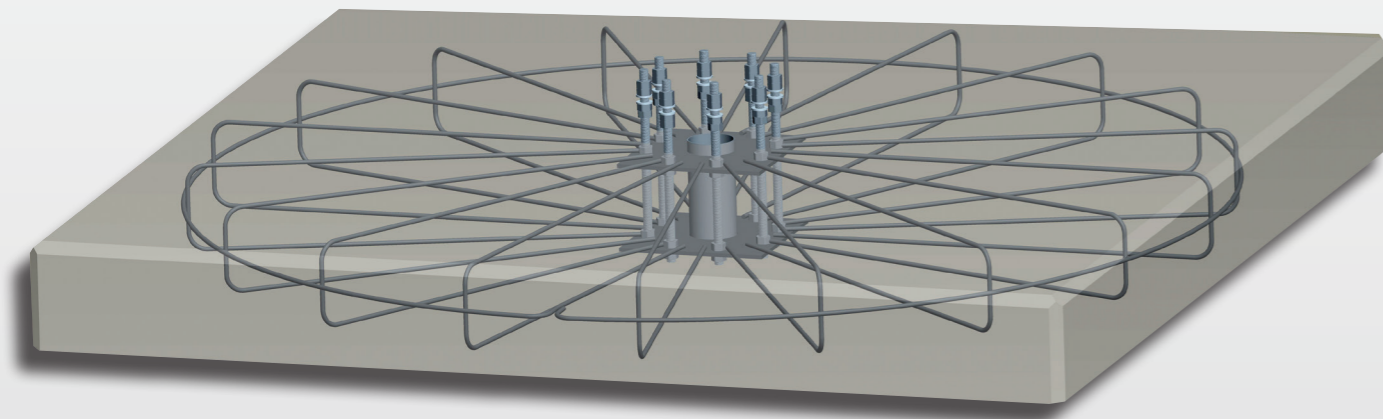


More information visit

www.solar-motors.com

**Iron-reinforcement cage JASM44M3V15P**

Code: 7316

**Iron-reinforcement cage for Overground Concrete Foundation for Solar Tracker ST44M3V15P**

The foundation of the solar power system can take various forms. Consequently, optimum consideration can be given to the local conditions.

The rectangular overground foundation is generally used if a stony or rocky substrate precludes an underground variant of the foundation structure.



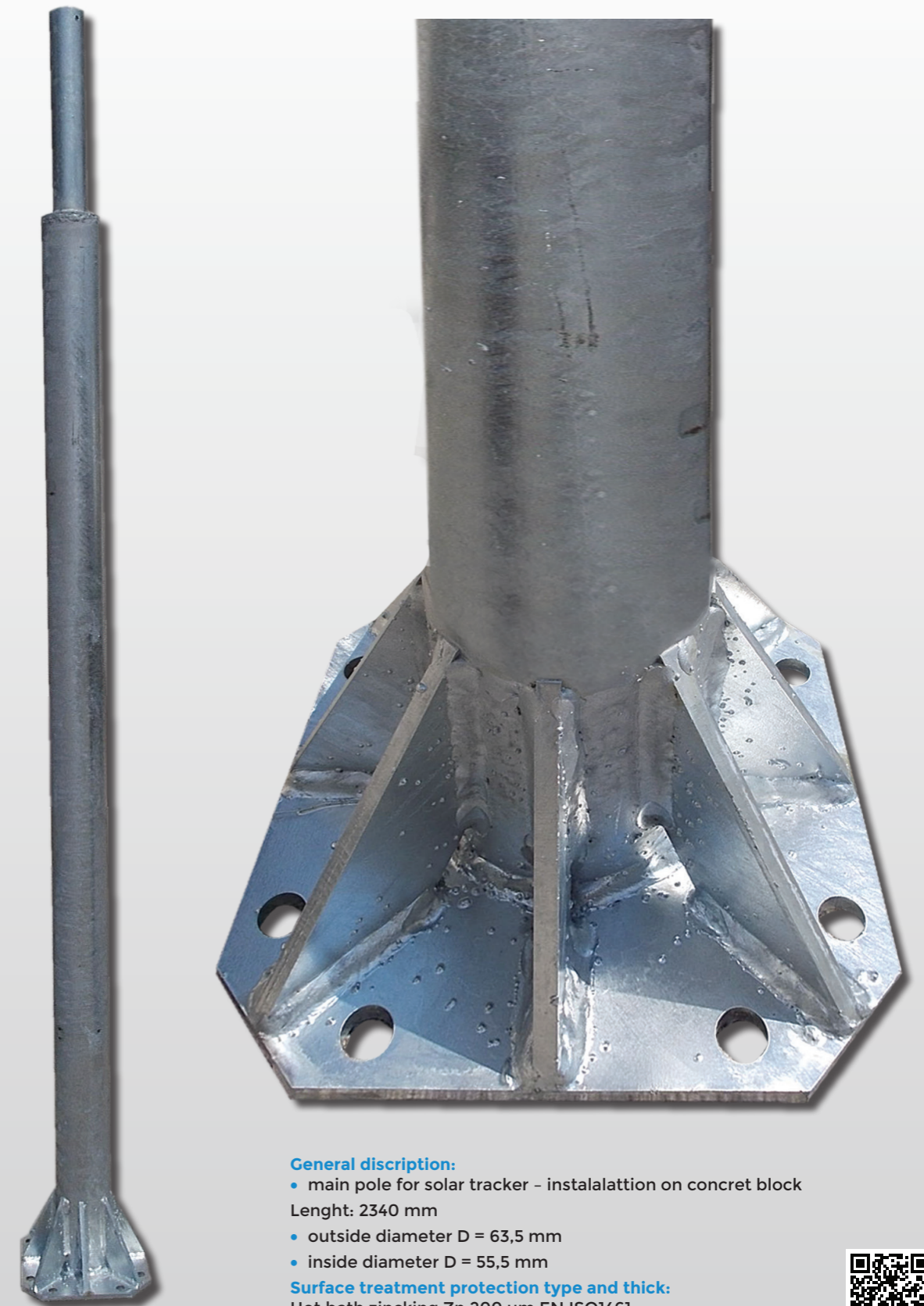
More information visit

www.solar-motors.com

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**Main pole for concrete block - NSST44M2V4P**

Code: 7507

**General discription:**

- main pole for solar tracker - instalalation on concret block
- Length: 2340 mm
- outside diameter D = 63,5 mm
- inside diameter D = 55,5 mm

**Surface treatment protection type and thick:**

Hot bath zincking Zn 200 um EN ISO1461



More information visit

www.solar-motors.com

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### Wind sensor WS50 / up to 50 m/s

Code: 0213

**Product Description**

**Specifications:**

- Wind sensor for measuring wind speed
- With metallic bracket mounting



**Installation and Operating Instructions**

**Technical data**

- Measuring range: 2–50 m/s
- Electrical output: 0–73.4 Hz at 50 m/s
- Contact type: Hall sensor
- Load: max. 60 m/s, temporary
- Maximum load: 50 mA, max. 30 VDC
- Operating temperature: –30°C to +70°C
- Material: PC white (Macrolon 2405, UV stabilized)
- Wiring cable: 10 m long, LiYY 3 x 0.25 mm<sup>2</sup>, blue
- Power supply: 10–30 VDC, 10 mA
- Dimensions: H 126 mm x Ø 123 mm
- Mark of conformity: CE

**Installation and Operating Instructions**

**Wind speed values**

Beaufort	m/s	km/h	Wind speed level
0	0–0.2	0–0.8	Calm
1	0.3–1.5	0.9–5.5	Light air
2	1.6–3.3	5.6–12.1	Light breeze
3	3.4–5.4	12.2–19.6	Gentle breeze
4	5.5–7.9	19.7–28.5	Moderate breeze
5	8.0–10.7	28.6–38.8	Fresh breeze
6	10.8–13.8	38.9–49.8	Strong wind
7	13.9–17.1	49.9–61.7	Near gale
8	17.2–20.7	61.8–74.3	Gale
9	20.8–24.4	74.4–88.0	Severe gale
10	24.5–28.4	88.1–102.4	Storm
11	28.5–32.6	102.5–117	Violent storm
12–17	32.7–56	118+	Hurricane



More information visit

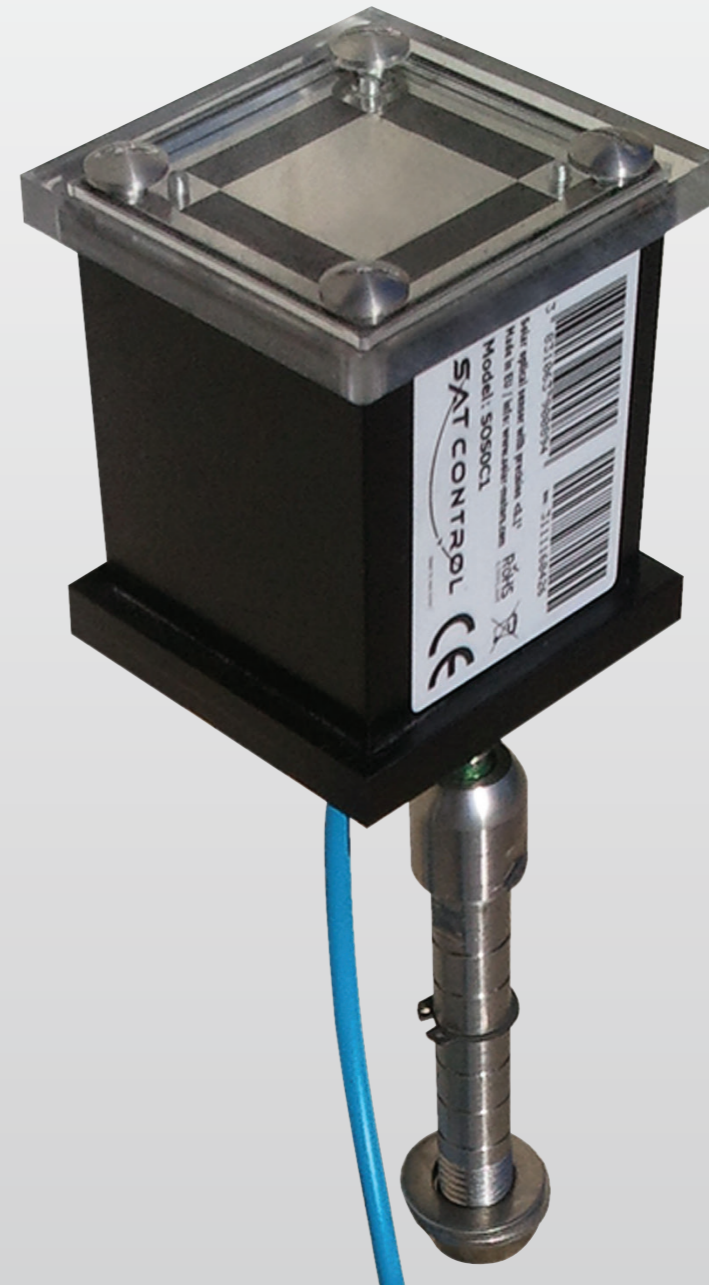
### Solar Optical Sensor SOSOC1 / 383106390089

Code: 0089

**Product Description**

**Specifications:**

- Optical sensor for fine tuning of Solar Tracker for concentrator applications
- Precision better than 0.1°



More information visit

## 11. Weather sensor

**Solar irradiance sensor**

Code: 0103

- Silicon irradiance sensors provide a simple and cost-effective opportunity to monitor the performance of a solar system at any time.
- Only if the real yield and the actual solar irradiance are measured in parallel, you can realise component failures immediately. Also faults, which are affecting the performance of the solar system only little, can be recognised much better and therefore eliminated earlier.
- Everybody, who wants to ensure, that the PV solar system runs at best performance, cannot abandon to use a silicon irradiance sensor!

**Appreciation of your System Monitoring**

Enhance your monitoring system with our solar irradiance sensors. That enables your system with powerful functions for a precise on-site performance calculation and a reliable recognition and alerting, when an error occurs.

**Advantages**

- Built completely as a solar module, therefore extremely good comparability to energy yields and system performance of PV systems, temperature compensation for higher accuracy
- The optional cell temperature is a very good alternative to directly measured module temperature and leads to a higher accuracy in yield forecasting

**General data**

Solar cell: monocrystalline silicon

- Measurement: possible up to 1400 W/m<sup>2</sup> (depending on sensor type)
- Working temperature: -20°C to 70°C
- Electrical connection: via 3m cable, uv and weatherproof
- Case, protection mode: powder-coated aluminum, IP 65
- Error with temperature compensation compared to pyranometer within the operating range of -20°C to 70°C and vertically beam of irradiance): ±5%



More information visit





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