THE SOLARMINI AND SOLARMAX, SHAPE YOUR ULTIMATE IOT TELEMETRY SOLUTION

Solar products from Avic are advanced IoT and telemetry devices designed specifically for reliable and maintenance-free operation in various applications. They offer a wide range of features to meet all your monitoring, surveillance, and control needs. With an extensive array of internal sensors and the capability to connect external sensors, the possibilities are virtually limitless. The Solar products boast unique characteristics.

These Solar products supply power to your external sensors, providing you with great flexibility in connecting your sensors. They can work with standardized signals such as 4-20 mA, 0-10 Volts, and digital signals, and offer a serial RS485 Modbus interface, allowing integration with nearly any sensor.

Powered by solar energy and free from batteries or accumulators, the Solar products offer a completely autonomous solution that requires no periodic maintenance. They are the ideal autonomous telemetry devices that can be deployed with minimal installation effort. An internal graphene-based supercapacitor ensures that the devices can function for up to 6 months, even without sunlight.

Solar products are ready for immediate use, enabling you to effortlessly collect sensor data from anywhere in the world. There are also versions of the SolarMini with two digital outputs, allowing you not only to gather data but also to control and manage it. This makes it ideal for projects such as irrigation, where water valves can be controlled.

Plug & Play   **Maintenance free**   **For all your sensors**

SolarMini and SolarMax
A revolution in reliable, maintenance-free IoT & Telemetry

AVIC

With Solar products, you not only acquire a reliable and maintenance-free telemetry solution but versatile devices that assist you in managing your sensors and taking action when necessary. It's the smart choice for all your IoT and telemetry needs.

SOLARMINI

The Solar Mini is the ideal solution for fully autonomous and maintenance-free measurement and control. Thanks to its standard connectivity options, a wide variety of sensors can be connected. The internal supercapacitor, in combination with the solar panel, provides the power supply. With the GPS receiver, you always know where the SolarMini is located.

SOLARMAX

The SolarMax, with its 10 times larger solar panel, has more energy available than its smaller counterpart, providing it with more connectivity options for sensors. The SolarMax features an RF gateway for reading wireless sensors. The larger solar panel enables frequent sensor readings and regular communication with the data center.

SOLAR PRODUCTS
ARE THE SMART CHOICE
FOR ALL YOUR IOT AND
TELEMETRY NEEDS

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MAIN CHARACTERISTICS

Solar products require no regular maintenance

They are designed to withstand even the most challenging environments. Thanks to the UV resistance and the IP67 classification of the SolarMini and the IP65 classification of the SolarMax, Solar products can withstand water and extreme weather conditions, ensuring consistent and reliable performance. The supercapacitor makes battery replacements a thing of the past.

Indestructible Housing
The housing of Solar products is made from highly durable ASA plastic reinforced with 40% fiberglass. This renders the housing practically indestructible, even under demanding conditions. You can rely on the durability of Solar products no matter where you deploy them.

Internal Antenna for Enhanced Reliability
In many systems, external antennas can be vulnerable to damage or interference. Solar products have the antenna internally integrated, significantly reducing vulnerability. This not only enhances durability but also ensures that the antenna is perfectly tuned to the modem for optimal performance

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Simple and Reliable Connections
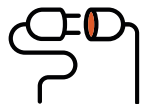Solar products utilize industrial M12 connectors, making the connection of sensors fast and straightforward. These connectors not only offer ease of use but also, thanks to their gold-plated contacts, provide an extremely reliable and maintenance-free connection to the Solar products.

SOLAR PRODUCTS REQUIRE NO REGULAR MAINTENANCE

ROBUST   EASY TO CONNECT   INTERNAL ANTENNA

- The digital outputs (SolarMini only) provide "open pulse" or "close pulse" options (especially for low-power valves).

This means that nearly any sensor can be connected seamlessly. Additionally, Solar products provide power to the sensors. Sensors are powered for a period before measuring to ensure they have enough time for accurate readings. This combines precise measurements with extremely efficient energy consumption.

RS485 with Modbus Support
For specific needs, Solar products also offer a version with a serial RS485 interface with Modbus support. This allows for reading intelligent sensors and provides even more flexibility for complex applications.

High Accuracy.
To ensure that your measurements are of the highest quality, we have chosen a high-quality 24-bit Analog-to-Digital Converter (ADC). This enables analog measurements with high accuracy and high resolution. Accuracy and reliability always take precedence with Solar products. Calibration and adjustment can be done through the platform.

WITH SOLAR PRODUCTS, ACCURACY AND RELIABILITY ALWAYS COME FIRST

Solar products offer endless application possibilities.

Thanks to the versatility of Solar products, you can use them for a wide range of applications. Virtually any sensor can be integrated with Solar products, giving you the flexibility to choose the sensor types that best suit your measurement needs.

Standardized Analog Inputs
Solar products adhere to industry standards

- Analog inputs work with both 4-20mA and 0-10 Volt signals.
- Digital inputs are standard open collector inputs.

STANDARD
SENSOR INTERFACES

MODBUS
SUPPORT

HIGH
ACCURACY

Energy Efficiency Perfected

Solar products are masters of energy efficiency, consuming only 23uA in standby mode. For communication, they rely on the 4G standard and Cat M1, an energy-efficient method that combines an impressive range with extremely low energy consumption.

Smart Energy Management for Sensors
Whether it's internal or external sensors, Solar products activate them only when measurements need to be taken. Calculations are also performed periodically, with energy efficiency always a top priority. Communication moments are dynamically adjustable to avoid unnecessary communication while still providing minimal-delay alerts.

With Solar products, you are assured of an excellent balance between energy efficiency and effective communication, combining long energy autonomy with rapid and accurate response when needed.

Sustainable Energy Supply Using Solar Energy

Thanks to the extremely low energy consumption of Solar products, it is possible to power both the Solar products themselves and external sensors with a compact solar panel. The 500mW (SolarMini) and 5 Watt (SolarMax) solar panels are made of glass. The choice of glass not only makes the solution maintenance-free but also guarantees years of top performance without noticeable degradation as is the case with plastic panels.

Sustainable Energy Storage with Supercapacitor
Excess solar energy generated is stored in a supercapacitor. This supercapacitor has a lifespan of over 10 years and can withstand very high temperatures (up to 70°C) and extremely low temperatures (down to -30°C). Unlike traditional batteries or accumulators, the supercapacitor never needs replacement during the lifespan of Solar products. The SolarMini has a buffer capacity of 13 Wh, while the SolarMax has a capacity of over 100 Wh.

Long-Term Energy Supply, Even Without Sun
Depending on your settings, such as measurement and communication frequency, the supercapacitor can supply the Solar products with energy for many months, even in situations with little or no sunlight. This ensures the reliable and continuous operation of your Solar products, regardless of weather conditions

CHOOSE SOLAR PRODUCTS FOR AN ECO-FRIENDLY, ENERGY-EFFICIENT, AND SUSTAINABLE SOLUTION

THE EXTERNAL SENSORS ARE POWERED BY THE SOLAR DEVICE

SUPERCAPACITOR FOR ENERGY STORAGE

LONG-TERM ENERGY SUPPLY, EVEN WITHOUT SUN

Internal Sensors

The solar products come equipped with an extensive set of internal sensors. These sensors, when used in conjunction with external sensors, can be employed to derive data points through formulas. This data can be locally transformed into information within the unit.

- GPS sensor for monitoring the box's position.
- Built-in accelerometer (to monitor, for example, the box's orientation).
- Barometer for measuring air pressure inside the housing. The installed "breather" element allows for pressure equalization between the housing and the outside environment. The barometric pressure can be used to eliminate the influence of air pressure when using absolute pressure sensors.
- Relative humidity sensor & temperature sensor (available in the SolarMax).

Hub for Wireless Sensor Network (SolarMax)

The SolarMax also features an internal interface for wireless sensors. This means the SolarMax can be used as a router for Avic's wireless sensors. Avic offers an extensive range of wireless sensors. We refer to these products as the "Wise" products. Some variants come with internal temperature and relative humidity sensors, while other models allow you to connect 4-20 mA sensors or 0-10 Volt sensors, enabling wireless readings for almost any type of sensor.

What makes the Wise products particularly appealing is their exceptional energy efficiency, which allows them to measure for over 5 years in most cases before a battery replacement is needed. Due to the operating frequency used, there is no interference with Wi-Fi networks, and you can rely on an excellent range of over 600 meters in an open field. The right radar products for every situation. The combination of the SolarMax with RadarWise has proven to be very successful in practice.

The RadarWise is a "Wise" product, where an advanced radar sensor is combined with an RF transceiver operating at 868 MHz. In practice, you can combine up to 7 RadarWise sensors with a single SolarMax gateway, making it ideal for monitoring fluid levels in groups of tanks or multiple water level measurements in locations where power is not readily available.

AVIC OFFERS A WIDE RANGE OF WIRELESS SENSORS

GPS SENSOR

TEMPERATURE AND HUMIDITY
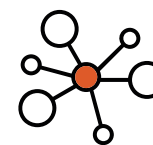
WIRELESS SENSOR HUB

Simplified Configuration and Commissioning

Solar products make it extremely easy to get started. The entire configuration process is automated and managed from our advanced data center. This means there is no need for local configuration on the Solar products themselves. All settings can be effortlessly configured through our platform, with only the relevant options for your specific application displayed. This makes commissioning the Solar products remarkably straightforward. All you need to do is connect the sensors to the Solar products via our industrial M12 connectors. The internal clock is precisely synchronized with our data center, and both date and location are known, enabling advanced clock and scheduling functions.

No Hassle - Just Plug and Play
The Solar products will automatically operate with the settings you input through our platform. It couldn't be simpler to commission the Solar products.

Simple Local User Interface
Using a small magnet and the reed contact of the solarMini, several functions (modes) can be activated. For instance, briefly holding a magnet against the exterior will enable the box to communicate. Having direct feedback from the Solar products can be useful, especially during commissioning. A single red LED provides feedback on the mode of the SolarMini through a flashing sequence.

Flexible Mounting Options
The SolarMini feature three M4 mounting points, allowing you to effortlessly attach them to a wall or surface. You can choose to mount the Solar products horizontally or vertically, but vertical mounting is recommended to avoid potential contamination of the solar panel when placed horizontally.

SOLAR PRODUCTS
MAKE IT EXTREMELY
EASY TO GET STARTED

MAGNETIC CONTACT
FOR VARIOUS MODES

With the LegioBox product family, including Solar products, you have extensive capabilities to perform calculations within the box. This option also ensures that detected alarms can be forwarded immediately without delay. It's also possible, for instance, to dynamically adjust the communication frequency based on a calculated data point. Formulas or calculation rules can be organized through the platform and may include time and date. The Solar products are time-synchronized with the data center.

Control and Regulation
There is also a version with digital outputs, allowing the Solar products to be used for process control, such as water valves for irrigation purposes. The Solar products can use PID controllers or other control algorithms.

Security

The Solar products use powerful AES 128 encryption for data transmission to prevent misuse. The Solar products cannot be accessed directly but will independently establish a connection with the data center (call-back mechanism). This makes misuse of the Solar products impossible. A Chip-Sim or SoftSim is used, making theft of the Sim card impossible. Security by design was the guiding principle during the development of the Solar products.

Edge computing

To fully leverage IoT, data often needs to be processed to transform it into information. This means you often want to receive alerts based on a calculated (derived) value from a data point. Examples include:

- Alerts based on the calculated contents of a tank.
- Faster measurements and communication when sewage levels rise.
- Irrigation based on various measured parameters or the time of year

SECURITY BY DESIGN.

APPLICATIONS

Solar products can be used in various applications.

Tank monitoring
It is possible to connect two pressure sensors to the Solar products. For cryogenic tanks, the absolute pressure in the tank can be measured, and the liquid level can be determined using a differential pressure sensor. For chemical tanks, it is better to use radar sensors, which can remain outside the medium. This is a simple plug & play solution that requires no maintenance.

Environmental Monitoring
Monitoring the fill level of chemical tanks can help in early detection of potential leaks or spills. This contributes to environmental protection and prevents contamination. A leak detection sensor or a pressure sensor can be connected to the Solar products for leak detection.

Agriculture
Soil sensors can be connected to the Solar products to determine the moisture content in the soil. Sensors can also determine salt concentration. With this information, it can be determined if and when irrigation is necessary. The SolarMini is also available in a

OUR GOAL IS TO
MAKE ADVANCED
TECHNOLOGY
ACCESSIBLE

Water and Air Quality

It is possible to connect sensors to the solar products for monitoring water quality. Especially in locations where power sources are limited, the Solar products offer significant advantages. Parameters like conductivity, pH, turbidity, oxygen, or chlorine are frequently measured to assess water quality.

Smart Infrastructure & Smart Cities

Smart cities leverage advanced technologies, particularly the Internet of Things (IoT), to increase the efficiency, sustainability, safety, and quality of life for residents. Our solar products collect valuable real-time data on various aspects of city life, such as air quality, energy consumption, water levels, sewer overflow, ground conditions, and waste management. This data is analyzed through the Avic platform Avision, enabling city administrators to identify trends and make informed decisions. In short, IoT technologies are transforming urban systems into smart cities that are more effective, sustainable, and responsive to the needs of their residents. Thanks to the maintenance-free nature and user-friendliness of our solar products, they are an ideal choice for these smart cities

GPS ASSET TRACKERS ARE ESSENTIAL TOOLS FORCOMPANIES LOOKING TOIMPROVE THEIR ASSET MANAGEMENT

Asset tracking

The GPS asset tracker in the solar products can be used to accurately track and record the real-time location of valuable assets such as vehicles, equipment, or high-value items. It utilizes Global Positioning System (GPS) and Quasi-Zenith Satellite System (QZSS) technology. This technology enables businesses to optimize asset utilization, enhance security, and streamline operations by gaining insights into asset movements, maintenance needs, and usage patterns.

GPS asset trackers are indispensable tools for companies looking to improve their asset management, reduce losses, and increase overall efficiency.

TECHNICAL SPECIFICATIONS

Dimensions and Weight

Catagory	Item	Solarproduct	
		Solarmini	Solarmax
Mechanical	Length (mm)	166	315
	Width (mm)	91	205
	Height (mm)	39	80
	Weight (kg)	0,45	2,50
	Enclosure Material ASA	●	●
	Glas Solar Panel	●	●
Environmental	Ingress protection	IP67	IP65
	Mechanical impact class (enclosure only)	IK08	IK08
	Operational temperature Range (min / Max in ˚C)	-30 / +70	-30 / +70
	Storage temperature Range (min / Max in ˚C)	-20 / +45	-20 / +45

Power supply:

Catagory	Item	Solarproduct	
		Solarmini	Solarmax
Sensor Power supply	Nominal VSE sensor Power voltage (VDC)	14	14
	Maximum VSE current (mA)	60	60
	VSE sensor voltage regulation	+/- 1%	+/- 1%
	Analog-to-Digital conversion (ADC) resolution (bits)	24	24
Power supply	Glass Solar panel power performance	0,5 Watt	5 Watt
	Power storage	13,5 Wh	108 Wh

External Interfaces & Internal Sensors

Interface group	Interface Function	Solarproduct							
		SolarMini Telemtrie	SolarMini RS485	SolarMini RS 232	SolarMini SDI-12	SolarMini Ex	SolarMini Control 1	SolarMini Control 2	SolarMax
Digital inputs	Digital Inputs (non-Isolated)	1-2	0-1	0-1	0-1	-	0-1	-	0-2
	Solenoid Output (puls)	-	-	-	-	-	1	2	-
Analog sensor	Sensor Supply voltage	14 VDC (maximaal 60 mA)							
	4-20 mA Sensor interface	2	1	1	1	2	1	-	2
	0-10 Volt Sensor intercae	0-1	0-1	0-1	0-1	-	0-1	-	0-2
	PT1000 Sensor interface	1	2	2	2	-	1	1	2
Data ports	RS485	-	1	-	-	-	-	-	1
	RS232	-	-	1	-	-	-	-	-
	SDI12	-	-	-	1	-	-	-	-
Environmental sensors	Barometric Pressure sensor	1	1	1	1	1	1	1	1
	Temperatire sensor	1	1	1	1	1	1	1	1
	Relative Humidity sensor	-	-	-	-	-	-	-	1
	Accelerometer & Level glas	1	1	1	1	1	1	1	1
	GNSS	1	1	1	1	1	1	1	1
User interface	Vsiual indicators	1	1	1	1	1	1	1	9
	User switches	1	1	1	1	1	1	1	2

Communication

Catagory	Communication			
	2G (GPRS)	CatM1	NBIoT	RF tranceiver 868Mhz
SolarMax	Yes	Yes	Yes	Yes
SolarMini	No	Yes	Yes	No

THE IOT PLATFORM 'AVISION'

Avision, Avic's IoT platform, is used to store data from the Solar products and provides you with the ability to visualize, set up alerts, generate reports, and make data available through APIs (publish). Avision is a combination of a device management platform with an asset management platform and a maintenance platform.

- **Device Management**
  With our platform, you can effortlessly manage and monitor all your IoT equipment, such as the Solar products. You can quickly check the status of your IoT devices, including their power status. Thanks to the built-in acceleration sensors and GPS in all our radar products, you can also verify the correct positioning of your Solar device.

- **Asset management**
  We represent your asset using a digital twin that describes your asset as accurately as possible. You get immediate insights into your measurements, such as liquid level, pressure, temperature, or the content of your tank.

- **Maintenance management**
  Avic also offers predictive modules that inform you when maintenance is required or when a visit to your asset is necessary. Please note that these predictive modules depend on your specific situation and may require additional sensors for optimal operation. Contact us if you are interested in this functionality.

WITH OUR PLATFORM, YOU CAN EFFORTLESSLY MANAGE AND MONITOR ALL YOUR IOT EQUIPMENT

WITH AVISION, YOU GAIN INSIGHT INTO YOUR OWN DIGITAL TWIN WITH ALARM MANAGEMENT AND PERIODIC REPORTING

Avic has created an extensive range of digital twin objects for various applications. These standard objects can be seamlessly integrated into your application. We are ready to advise you on which objects are most suitable for your needs. Avic also offers sensors for virtually every application. With the Avision IoT platform, you can develop a complete IoT application that brings together all your technical data and allows you to draw meaningful conclusions based on reliable information from maintenance-free IoT data loggers like the SolarMini and the SolarMax.

Reporting

In Avision, you can have reports generated and distributed periodically. These reports can be generated daily, weekly, or, for example, every month. The reports can include graphs and tables and can show you statistical data. A large number of sample reports are available, but Avic can also design a report specifically for your situation.

Alarming

If you want to be notified when an event occurs, such as a sewer overflow, a water level that is too high or too low, or a tank that is almost empty, you can automatically send alerts via email or SMS. Avision provides you with advanced alerting scenarios that allow you to notify the right people depending on the type of alert and the time it occurs. These scenarios also include the option to escalate alerts when no action is taken quickly enough.

INTERFACES TO OTHER BACK-OFFICE PRODUCTS

API

An API, or Application Programming Interface, is a set of rules and protocols that enable different software applications to communicate with each other and exchange information. It is a way for different pieces of software to work together and share data without users being aware of the complexity of this interaction.

Our API serves as a seamless communication bridge between your business systems and our services. It allows your software to talk directly to ours, as if they speak the same language. Your application sends a request to our API with specific instructions or data needed. Our API processes the request and retrieves the required information. The API sends the results of the request back to your application in a structured format such as JSON or XML.

FTP

It is also possible to facilitate data exchange between Avision and your own systems through an FTP connection. An FTP (File Transfer Protocol) interface for an end user is a software application that allows files to be transferred between computer systems using the FTP protocol.

WITH API AND FTP, YOU HAVE ALL YOUR DATA AVAILABLE IN OTHER SYSTEMS

THE SOLARMAX IS
A SOLAR-POWERED
GATEWAY THAT CAN
OPERATE COMPLETELY
AUTONOMOUSLY

ACCESSORIES (OPTIONAL)

Mounting accessories

The installation of dataloggers in the field can sometimes be challenging. Avic offers mounting accessories that significantly simplify the process for both the Solar Max and the Solar Mini. Our solutions include:

- Wall Mount for Solar Max, Our wall mounting option allows for a stable and secure installation on a wall.
- Pole Mount, For those who prefer pole or pipe mounting, we provide specific mounting accessories to securely attach the Solar Max or the SolarMini to a pole

For the SolarMini, there is also the option of wall mounting. An accessory is not necessary; you can directly mount the SolarMini on the wall using the three pre-existing mounting holes. With Avic's mounting accessories, the installation of your data loggers becomes an efficient and reliable task, allowing you to start your projects quickly.

Charger for SolarMax & SolarMini

When the Solar products are not used for an extended period, the internal supercapacitor will slowly discharge. After about 1.5 to 2 years, the voltage becomes so low that the product needs to be charged before you can use the solar again. Using a 5 Volt adapter, the SolarMini can be fully charged, while a 24Volt adapter is used for charging the SolarMax. A complete charging cycle takes approximately 14 hours.

Wireless Sensor Network Products

Avic offers an extensive range of wireless sensors that can read almost any type of sensor. To read the wireless sensors, an RF gateway is required, such as the Avic NanoGate or the SolarMax.

- PicoWise internal temperature
- PicoWise external temperature
- PicoWise 2x 0-10 Volt
- PicoWise 2x 4-20mA + 2x DI
- PicoWise with radar sensor

SOLARMAX MAKES WIRELESS SENSOR NETWORKS FOR ADDITIONAL MEASUREMENTS VERY EASY

A COMPREHENSIVE
RANGE OF WIRELESS
TRANSCEIVERS MAKES
IT POSSIBLE TO
CONNECT A WIDE
VARIETY OF SENSORS,
INCLUDING RADAR
SENSORS.

Combine the Solar products with our Sensors

Our diverse sensors and accessories provide the opportunity to quickly create a complete solution. For example, there's a bracket available that allows you to integrate a rain gauge with a Solar product, giving you even more functionality from your system. Avic can support you with various sensors such as:

- Wind speed & wind direction
- Precipitation
- Light intensity
- Level measurements (radar)
- EC (Electrical Conductivity)
- PH
- Temperature and relative humidity
- Pressure
- Various soil sensors (Volumetric Moisture Content, Temperature)
- Various gas sensors such as NH_3, O_2, CO_2
- Fine particulate matter sensors PM2.5 / PM5 / PM10

IoT made simple.

Tank monitoring

Wastewater

Drinking water

Soil measurements and irrigation

Water Quality and Air Measurements

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