



*Professional Solar Mounting Systems
Ground Mount and Carport*

SCHLETTER



Contents	Page
General	3
FS System™	4
FSVario™ System	8
PvMax3™ System	9
Park@Sol™ Carport System	10
FS System, Reference Examples	11

Economic Ground Mounted Photovoltaic (PV) Systems

Schletter ground mount systems are designed to provide an economic and convenient mounting solution while allowing for large-scale installation of PV systems in almost any terrain. Our product selections include the unparalleled FS System, the versatile PvMax, and the space-optimizing Park@Sol carport system. Regardless of the system, Schletter uses state-of-the-art production procedures to ensure quick turn-around and delivery times for all standard components, as well as fast and flexible designs of custom projects.



The Schletter **FS System** reduces the total costs for utility and commercial-scale PV installations by using pile-driven galvanized steel posts, making the utilization of concrete foundations redundant and often a less cost effective alternative in both material and labor costs. The racking system configuration and design depend on wind and snow loads, tilt, module size, and soil composition.

Alternatively, the **PvMax3** system allows for ground mounted PV installation using concrete pads as a ballast. This system is often used on landfills, residential applications, or very rocky terrain where pier driven installations are not easily installed.

When selecting a Schletter system, our customers receive professional service and support from one of the industry's most experienced solar mounting manufacturers. Our team of technical sales, design, and engineering, guide and support customers through the process of selecting an ideal racking solution for nearly any given structure and PV array. Regardless of the system design, all load and structural data is examined to best determine the appropriate configuration, ensuring proper safety and design requirements meeting the 2006 (or 2009 where required) edition of the International Building Code (IBC) and/or the Ontario Building Code 2006. When the system design is complete and customer approved, the appropriate structural documentation package is provided with PE stamps in any given state, either by in-house engineering or a third-party, upon request.

We provide a voluntary warranty of 10 years on our system components. Schletter stands behind the quality, durability, and functionality of its products, and services its customers with professionalism.

PLEASE NOTE: Further information on the different systems is summarized in the product sheets.

➡ This sign always suggests additional documentation.

FS System™

Features and Benefits

- High level of pre-assembled parts
- Proven extremely short installation time
- High quality and sustainable materials
- Easily accessible for ground and system maintenance
- Included certified engineering by professional engineer licensed in the location of the project
- Included soil tests and pull out tests
- Options for in field adjustment, if needed



The Schletter FS Racking System has a proven worldwide product and installation history, with over 4 GW of ground mounted installations installed throughout the world with many FS installations ranking among the largest globally. Project specific system calculations and optimized material utilization address the ever increasing pressure to reduce costs in planning PV systems, taking into account balance of system (BoS). Complete structural calculations are provided for system design, while assuring compliance with current building codes and regulations.

With this established history and experience in ground mounted PV installations, the latest generation of the FS System offers a culmination of experience and the highest level of in-house pre-fabrication to date, while always maintaining the focus of making the overall cost of a PV system more competitive. **The result is an attractive system installed quickly, efficiently, and with the durability to last.**



Design Process

An important, and not to be neglected, detail in planning a ground mount system is thorough soil investigation and pull out testing of the pile (rammed) driven posts at the project site. Such testing generally requires embedding several test posts on site, and performing vertical pull-out and horizontal load tests. The results of these tests determine empirically the required embedment depth. Testing includes:

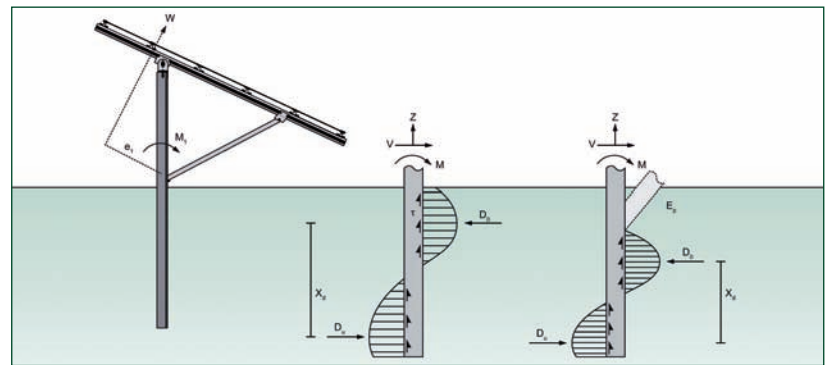
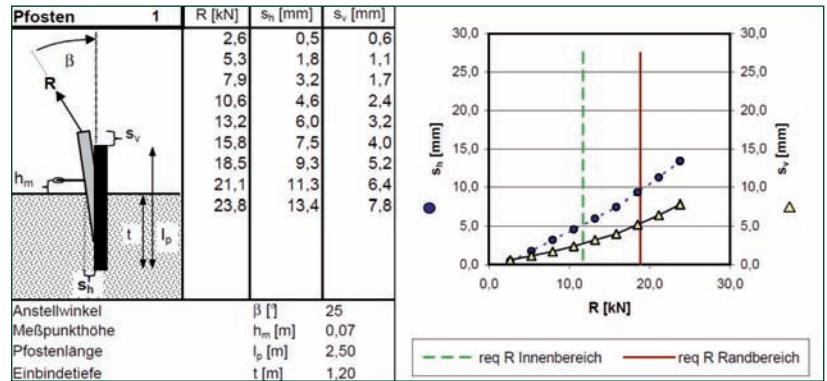
- Vertical pull-out tests
- Lateral load tests
- Independent laboratory analysis of soil classification, corrosion potential, gradation and soil plasticity

FS GeoTech Project Sheet

The **FS System posts** are comprised of hot-dip galvanized steel with a unique u-shaped design. Depending on the resulting structural calculations, applicable post sections (profiles) are used. This specially designed u-shape post grants optimum anchorage in the soil while maximizing the post strength. **The results from on-site tests conducted by Schletter confirm the embedment depth of the post.**

Installation of the posts into the ground is performed quickly by means of a terrain versatile hydraulic ram (GAYK). This pile-driving technique is an excellent choice for mid to large-scale power plant installations. On average, 250 posts per day can be driven into the ground using one machine (depending on the respective terrain and soil conditions). Even in difficult terrain conditions (gravel or stones), the pier driven foundation is possible. When faced with bedrock, the GAYK system can be equipped with a drilling unit. Navigating and installing posts on slopes up to 18 degrees, the ram is truly a time and cost saver.

Schletter reserves and offers pile driving (GAYK) machines for lease as well as purchase. The rams are leased or purchased directly from Schletter, at a competitive price. Contact a Schletter representative for more information.



Product Enhancements

Valuable installation time is saved, which results in a reduced cost of installation. Four simple steps are performed in the field. For more information on FS installation steps, please see the FS installation guide.

Schletter offers clamping solutions for any kind of module, including the more fragile frameless modules. We work with module manufacturers in order to find ideal clamping methods by performing structural FEM simulations with various modules and our clamping options.

The unique cross beam line of the triangular shaped S-Profiles feature a profile geometry that is designed for the optimal distribution of the forces with a variety of S-Beam sizes to choose from. The cross beams are attached to the support units using special pre-assembled mounting claws in the exact position needed in order to avoid measuring in the field. **The result is minimal material use needed to obtain the required structural demands.**

Module mounting is accomplished using the Rapid²⁺ product family, which drastically reduces mounting time during installation. Included in this product offering is the ETL Listed grounding middle clamp. The grounding Rapid²⁺ Module Clamps contain an integrated grounding pin that bond modules to the rack when clamped into place. **This saves time and material costs when compared to traditional lugs and copper wire.**

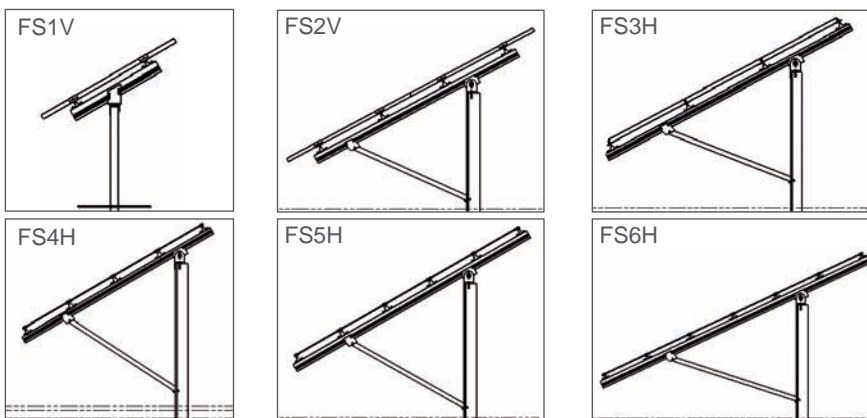
For frameless modules, Schletter offers a variety of clamping solutions. While framed modules are usually mounted in portrait (vertical), unframed thin-layer modules are most often mounted in landscape (horizontal), due to the module design requirements.

Accessories

To complete the product line and overall solutions, Schletter offers accessories contributing to a clean and professional look in wire management:

- Cable ducts
- Cable clips for cross beams
- Cable clips for girder
- Conduit-clip for post

Mounting Options



Time is Money

While reducing costs on the material side, there is a large focus on the reduction of labor time needed on the mechanical installation of the rack and modules. These two aspects combined have a large part in reducing Balance of System (BOS).

Technical Data

Material	<ul style="list-style-type: none"> Fastening elements, bolts: Stainless steel 304 and 316 Profiles (rails): Aluminium alloy 6105 T5 High life-expectancy, high residual value, no disposal costs Pile driven support posts: Steel, hot-dip galvanized with G235 <ul style="list-style-type: none"> - Easy plant re-powering due to modular design
Logistics	<ul style="list-style-type: none"> Quick and simple mounting Maximum level of pre-fabrication prior to shipment
Construction	<ul style="list-style-type: none"> Can be installed on uneven terrain Simple adjustment options Cost optimized configurations for framed and unframed modules
Accessories	<ul style="list-style-type: none"> Cable channels, cable ducts Components for potential equalization/grounding Clamps for every type of module
Calculations	<ul style="list-style-type: none"> 100% code compliant designs for any locality Third-party structural PE, stamped drawings and calculations Individual system structural calculations based on geotechnical report Individual system design calculations based on regional load values Design loads according to IBC 2006 or 2009 in U.S. and the Ontario Building Code 2006 in Canada Patented profile geometries with optimum material utilization Verification of all construction components based on FEM-calculation Earthquake simulation, optional
Available Third-Party Services	<ul style="list-style-type: none"> Geotechnical soil investigation and analysis Ramming of foundations Optional: rack installation Optional: module mounting PPA formation 
Terrain maintenance	<ul style="list-style-type: none"> Simple terrain maintenance due to single support <ul style="list-style-type: none"> - Specification of module height above ground possible
Grounding, Potential equalization	<ul style="list-style-type: none"> Components for the system grounding, integrated into module clamps
Warranty and Certifications	<ul style="list-style-type: none"> 10 year warranty, as with all Schletter systems, optional 20 years

FSVario

Based on the proven FS System design, the FSVario is an inexpensive option for ground mount seasonal module adjustments

- Perfectly synchronized system components for ease-of-motion from 10 to 45 degrees
- Few component obstructions for ground maintenance
- No concrete foundations* required, resulting in less environmental effects to surrounding soil during installation
- High durability as a result of ideal and suitable material combinations
- Extremely short mounting time

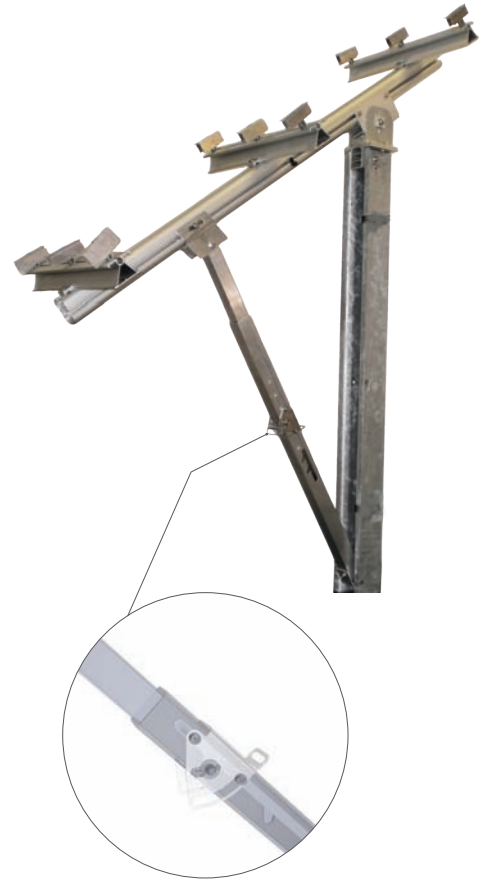
Based on the proven FS System, the FSVario allows for module repositioning while using the minimum required mechanical interfaces and no automatic control systems, resulting in a cost-effective alternative to motorized tracking systems. Made with quality, durable materials the FSVario has low system maintenance. As with most Schletter systems, the FSVario ships with a high level of pre-assembled components lending to expedited mounting times in the field.

Module tilt adjustment ranges from 10° to 45° and is accomplished through an adjustable strut positioned between the module support arm and the post. The complete module row (maximum length of 39 feet) can be smoothly tilted on its axis, accomplished by removing the clamping component on each support base. For seasonal adjustments of module rows, the FSVario is a quality, cost-effective choice.

➔ FSVario Product Sheet

* Concrete foundations only used in areas where soil testing prohibits pile driving.

** Call for specific lead times for the FSVario.



PvMax3 System

The PvMax3 is a ballasted ground mount racking system used in small to mid-sized residential or large-scale landfill installations. This system offers racking solutions in areas where pier driven posts are not possible, as is the case in residential locations or on aged landfill sites. In the case of landfills, the PvMax3 utilizes a ballasted ground-mount system, making the most of land that would otherwise be unusable.

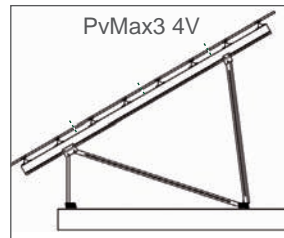
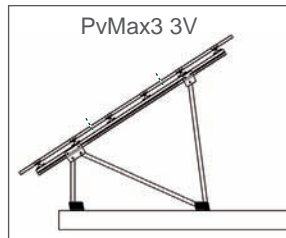
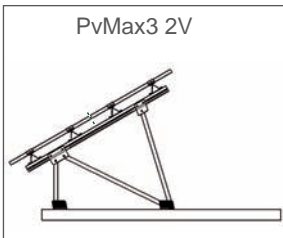
As with all Schletter systems, the PvMax3 comes with pre-assembled components, lending to the speed-of-installation. The system is designed to the specific requirements of a project with regards to wind and snow loads, tilt, and module dimensions. Adding to the overall system value, the PvMax3 can be offered as an easily stocked product, making this an attractive option for residential installations where quickly repeated solutions are necessary.

The core strength of the PvMax3 lies in the large spans achieved using the uniquely designed S-Profile rails. The S-Profile rails enable long spans, resulting in a low number of required supports, therefore reducing the number of concrete foundations needed. Made of aluminum, the PvMax3 is easily installed requiring no heavy machinery.

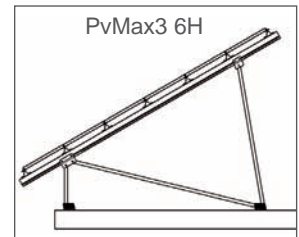
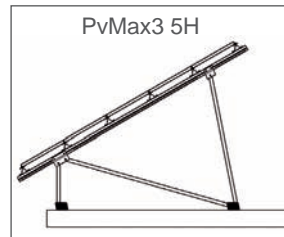
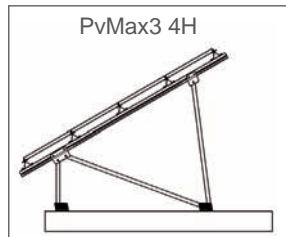
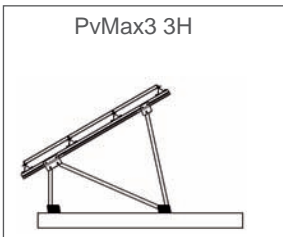
[➔ PvMax3 Product Sheet](#)



Mounting Options for the PvMax3 System



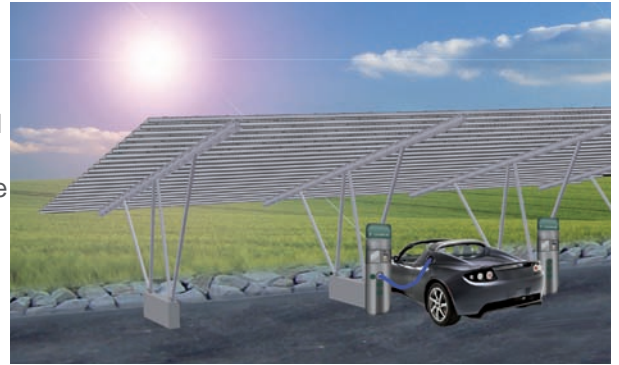
Note: The most cost effective configuration for a standard framed module is two modules stacked above each other in portrait (vertical) and a module string size long.



Park@Sol Carport System

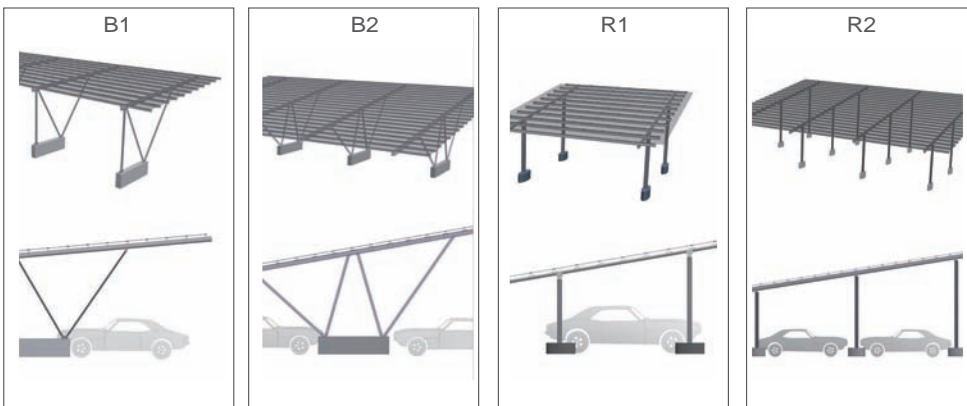
Parking areas covered by solar carports and shade canopies are a popular form of ground mount PV arrays, utilizing space efficiently. Designed to fit specific application requirements for both residential and commercial areas, Park@Sol will not only generate clean electricity but also offer welcoming shade on sunny days reducing temperatures in the vehicle interiors.

Schletter carries various designs for carport systems, including double and single row parking covering. In addition to being a fully functional carport system, the Park@Sol combines all the features of a well-planned PV system, with a quick and efficient installation.



- ➔ [Park@Sol Product Sheet](#)
- ➔ [Park@Sol Checklist](#)

Mounting Options



Because of the footer clearances, the B1 and B2 options are usually used for commercial parking structures. R1 and R2 are most often used for residential parking and general purpose shade structures.

Park@Sol: Installation References



Rack configuration: CS 11H 20° B2 28 rows
Performance: 69.3 kWp
Spans: 8.5 m
Measurements: 46.5 m x 10.9 m
Postal code: USA 85745 Tucson, AZ
Company: Solon / BV Solon



Rack configuration: CS 20H 8° B2 35 rows
Performance: 100 kWp
Spans: 5.00 m
Measurements: 42 m x 13 m
Postal code: 55286 Wörrstadt
Company: Juwi / BV Wörrstadt

FS System: Installation References

The following are just a few examples of solar fields installed using the FS System. More can be found on-line at www.schletter.us or www.schletter.ca. For specific design questions, please call a technical service representative at 520-289-8730 in the U.S. or in Canada at 519-946-3800.





How to contact us

Martin Hausner President / CEO

Direct: (520) 289 - 8811
Fax: (520) 289 - 8699
Cell: (520) 820 - 7458
Tucson, Arizona USA
martin.hausner@schletter.us



Ryan Kelly General Manager, Canada

Direct: (519) 946 - 3890
Fax: (519) 946 - 3895
Cell: (519) 819 - 0175
Windsor, Ontario Canada
ryan.kelly@schletter.ca



Schletter Inc.

3761 E Farnum Place
Tucson, Arizona 85706 USA

Tel: (520) 289 - 8700
Fax: (520) 289 - 8696
mail@schletter.us
www.schletter.us

Schletter Canada Inc.

3181 Devon Drive
Windsor, Ontario N8X 4L3 Canada

Tel: (519) 946 - 3800
Fax: (519) 946 - 3805
mail@schletter.ca
www.schletter.ca

For a comprehensive and competent consultation during the planning of your plant and for questions concerning logistics and order processing, our members of staff are available from Monday to Friday from 7 am to 5 pm.