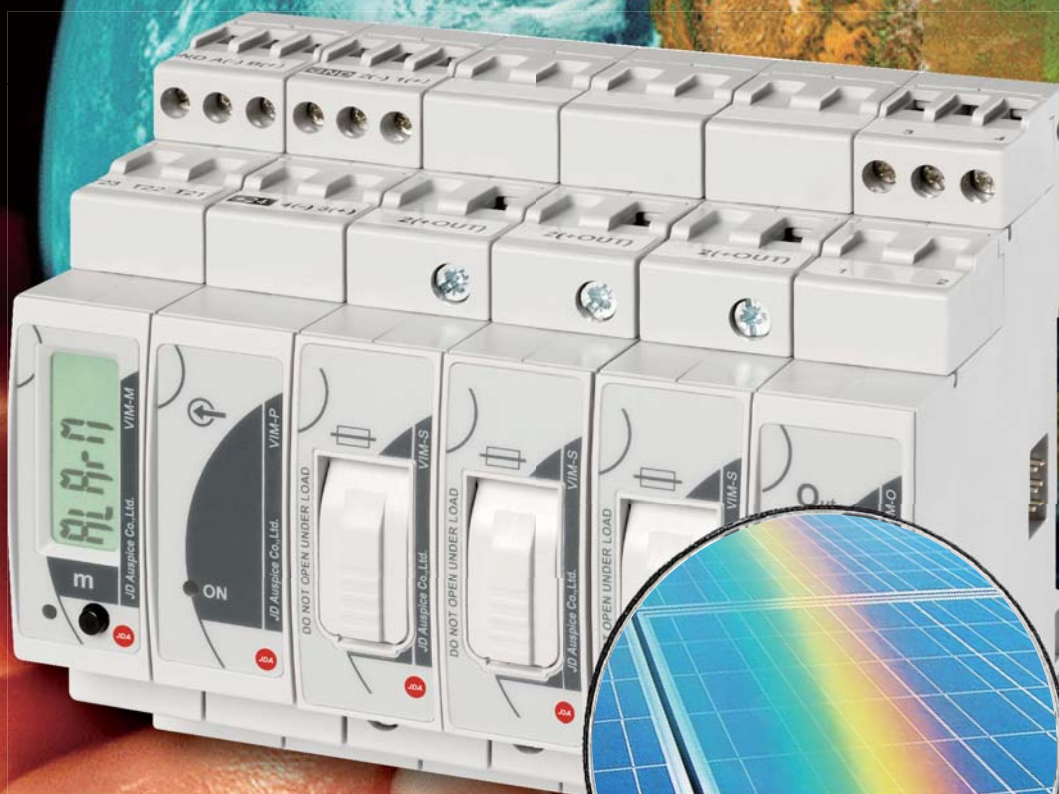
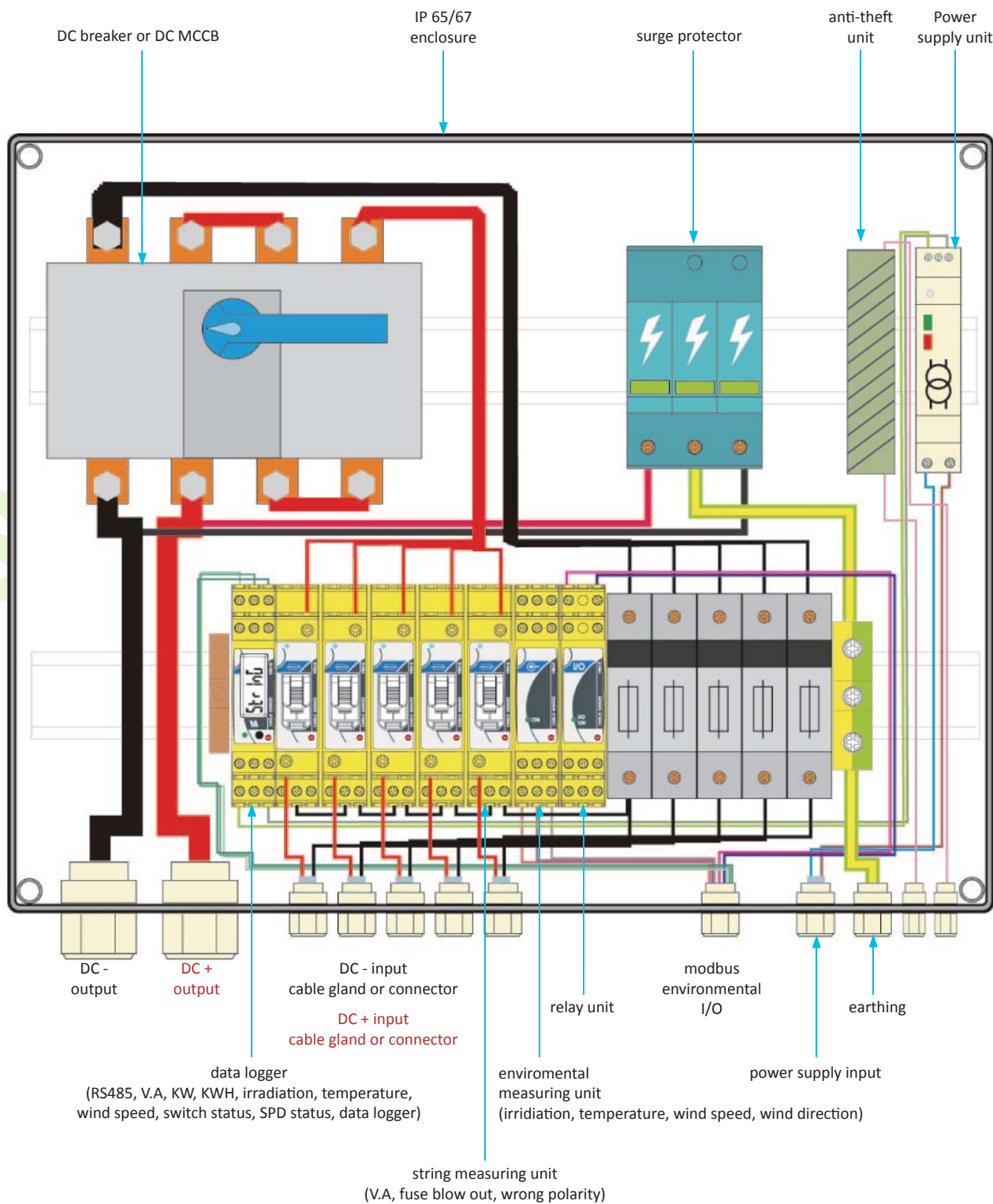


stringMoni[®]

Management and control system
for photovoltaic plants



Simple is better

Adding a control solution is now easy!

Note: Subject to change without any notice.

String monitor, Sever, GATE

Protecting the environment is a fundamental ideal that requires dedication and care, which is why every solar project is a vital project. It needs the same attention that we devote to the things we love.

Care and attention, are essential values for JD Auspice, when developing the control system for photovoltaic plants. This ensures the solar investment is a solid investment. The JD Auspice solution develops with stringMoni®, stringMoni® GATE and stringMoni® sever depending upon the requirements and complexity of the photovoltaic plant.

stringMoni® and stringMoni® Lite are systems comprised of individual modular elements that, when interacting with one another, provide efficient local control to the solar plant. Whether it's a small/medium power or high power plant, you are assured there is effective information management.

The stringMoni® provides a compact, simple, versatile and innovative solution. stringMoni®sever is a web server that controls and supervises the whole installation, while stringMoni®Gate using WEB-Service technique sends data to WEB portals Both solution can gather data from : • stringMoni® groups • Inverters • Energy meters
The stringMoni® sever and the StringMoni®Gate provide information in a quick and automatic fashion via the internet, so the data is available wherever you are.

Management and control system for photovoltaic plants

stringMoni® :

- Measurement and control functions split into independent modules in order to improve the critical system reliability.
- String efficiency and BOS efficiency measurements are fundamental parameters to evaluate the yield of the photovoltaic plant.
- Local alarm management for fast and easy identification.
- Integrated fuse protection for cost and installation time saving.
- stringMoni® application adaptability - the customer can choose according to his project philosophy which unit/s best suits his application giving him the freedom to find different solutions to his application problems.
- Features expansion capability based on usage of different modules and quantities so to meet application needs from small (10kWp) to large solar PV plants.
- Multicolor LEDs provide immediate feedback on variables, alarms, fuse status and communication, showing the relevant details on the display.

stringMoni® Sever :

- Cost effective yield efficiency and plant failure warning with additional manual or automatic database download for easy plant history analysis.
- Plant failure warning by means of e-mail and SMS in the case of external connection via modem. Plant database download by means of stringMoni®Soft.
- Notification of abnormal conditions as soon as they occur for a prompt service intervention.
- Comprehensive control solution capable of showing efficiency, yield graphs and the management of any useful information which is accesible by the user from any place in the world just by using his PC browser.

stringMoni® GATE:

- Monitoring up to 200kW photovoltaic installations by means of a remote Web Portal.
- Data polling (measurements and alarms) from stringMoni®, stringMoni® Lite solution, energy meters and inverters transmitted to a remote web-server by means of internet, using web-services to avoid firewall related issues.
- Use of "XML" (Extensible Markup Language) based communication protocols granting high degree of flexibility, allowing stringMoni® Gate to push data to multiple monitoring portals, like the JDA Web Portal.



How can you protect your investment?

A solar installation, never mind if it's small or large it's always an important investment.
You can protect your investment if :

- You meet the performance limits!
- You know the system is working properly!
- You realize the hoped-for solar electric performance level!
- You prove that you've produced results!
- You payback the investment!



The major control solution today

- Has fixed number of string controllers
- Is space consuming
- Is complex to wire
- Is difficult to repair when failure occurs
- Has yield data available mainly from the inverter.

How much money will you lose if your solar system stops for three days?
To ensure you don't lose money then you need a **CONTROL** solution.

A reliable control ... has to be an independent control!



Providing you with dependable and accurate data, promptly advising when :

- The photovoltaic modules are not performing
- The photovoltaic modules are not correctly connected
- The modules are removed (theft)
- The inverter fails

Moreover, focused control on every single string provides an immediate localization of the fault reducing significantly the service time and the missed yield costs.

stringMoni®: versatile, a characteristic that makes work easier



stringMoni® is a modular and can be formed by :
VIM-M the master unit and data logger;
VIM-S the string controller;
VIM-P the I/O unit, VIM-ANTI the antitheft sensor
and VIM-1 the isolation enhancement unit.



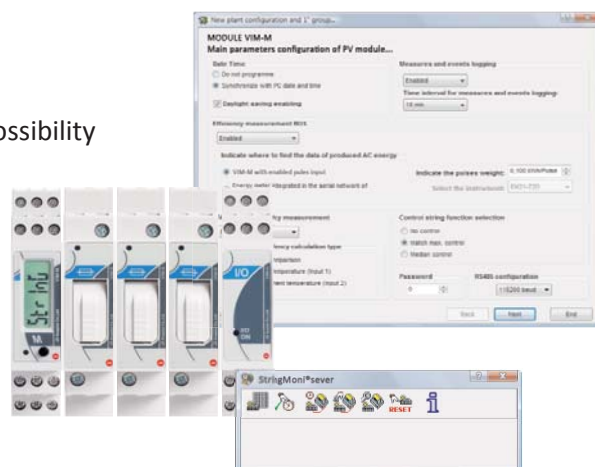
Integrated fuse protection

Standard, Lite

Information and control... everywhere

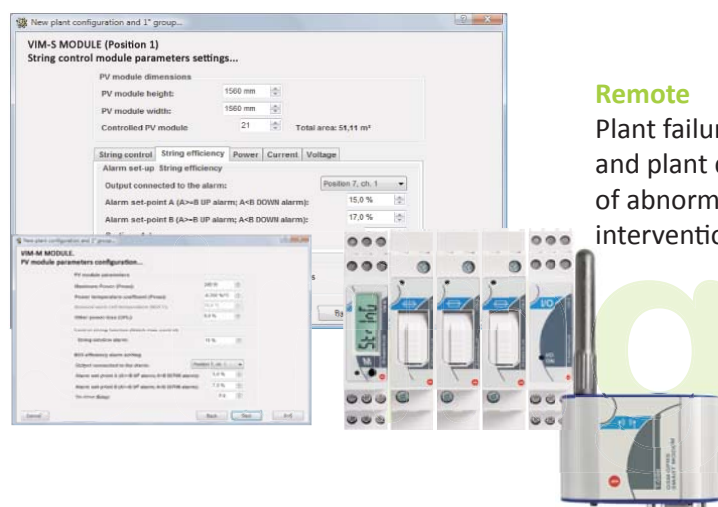
Local

stringMoni® control with local alarm output and with the additional possibility to be connected to a PC running freeware stringMoni® sever. Cost effective yield efficiency and plant failure warning with additional manual or automatic database download for easy plant history analysis.



Remote

Plant failure warning by means of GSM communication and proper SMS and plant database download by means of stringMoni® Soft. Notification of abnormal conditions as soon as they occur for a prompt service intervention.



Advanced

stringMoni® sever embedded Pc based WEB server capable to gather data from : stringMoni®, Inverters and Energy meters. Comprehensive control solution capable of showing efficiency, yield graphs and the management of any useful information which is accessible by the user from any place in the World just by using his PC browser.



stringMoni® Lite

stringMoni® Lite is the answer to those photovoltaic applications where a less sophisticated control is needed. This solution is based on the same overall concept of stringMoni® such as modularity, integrated string fuse protection but being focused to measure and control only the string current and voltage.

As undoubted result this string control provides an immediate string failure detection and localisation of the wrong PV panel connection, a faster plant commissioning and future maintenance.

stringMoni® Lite is specifically developed to be integrated in either a small or medium size photovoltaic park where all the most significant data are transmitted via RS485 Modbus at a maximum speed of 115.2 kbit/s to the local PV Energy Management System.

An essential working tool is represented by stringMoni®LSoft a freeware software which allows the user to easily configure stringMoni® Lite, check the communication wiring and remotely read the available measurement data.



Why to choose stringMoni® or stringMoni® Lite

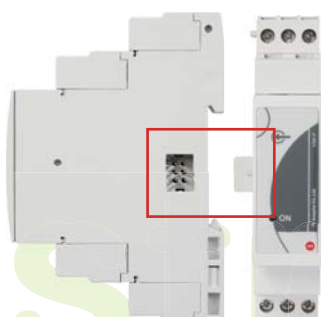
As each application has unique requirements, JD Auspice has designed distinctive products for solar applications offering an advanced control solution : • stringMoni® or a simplified control solution : • stringMoni® Lite



stringMoni® completeness of control, and antitheft control

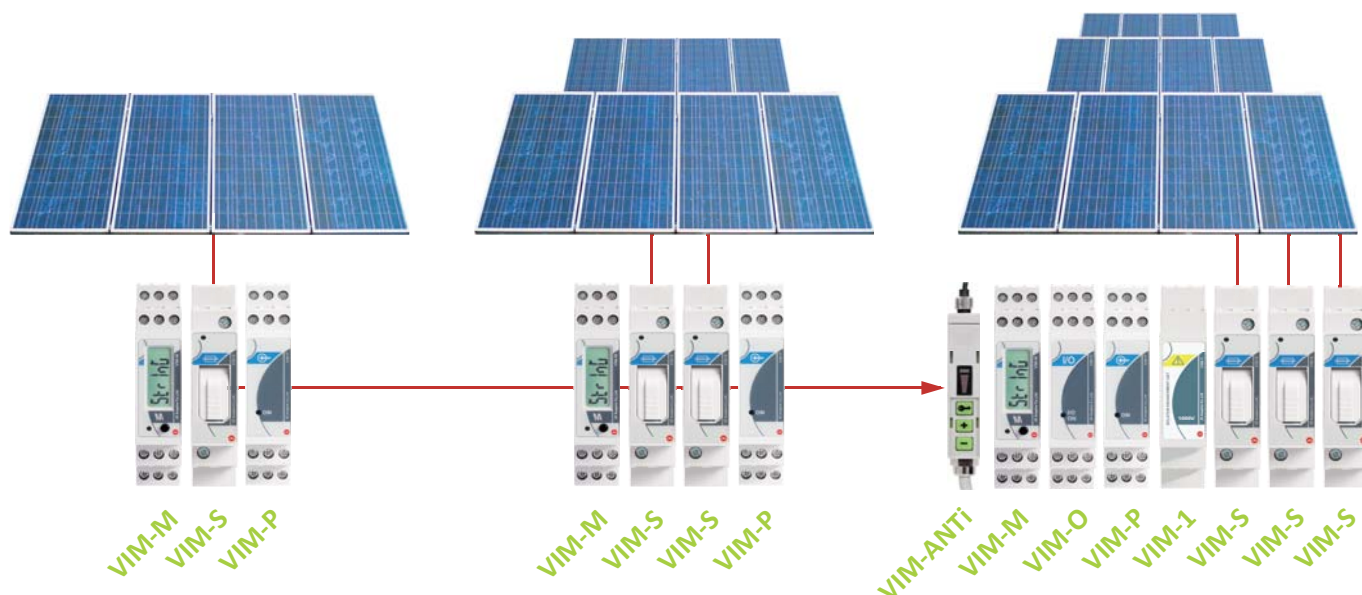


stringMoni® Lite synthesis of control



stringMoni® and stringMoni® Lite are provided with a specific communication and power supply bus that allows the modules to communicate each other in any needed configuration thus simplifying and reducing the installation time.

Versatility of stringMoni® and stringMoni® Lite



stringMoni® can be formed by :

1 VIM-M, up to 15 VIM-S, up to 7 VIM-O, up to 1 VIM-P but not exceeding 16 units and up to 3 additional VIM-ANTI antitheft sensors.

stringMoni® Lite can be formed by :

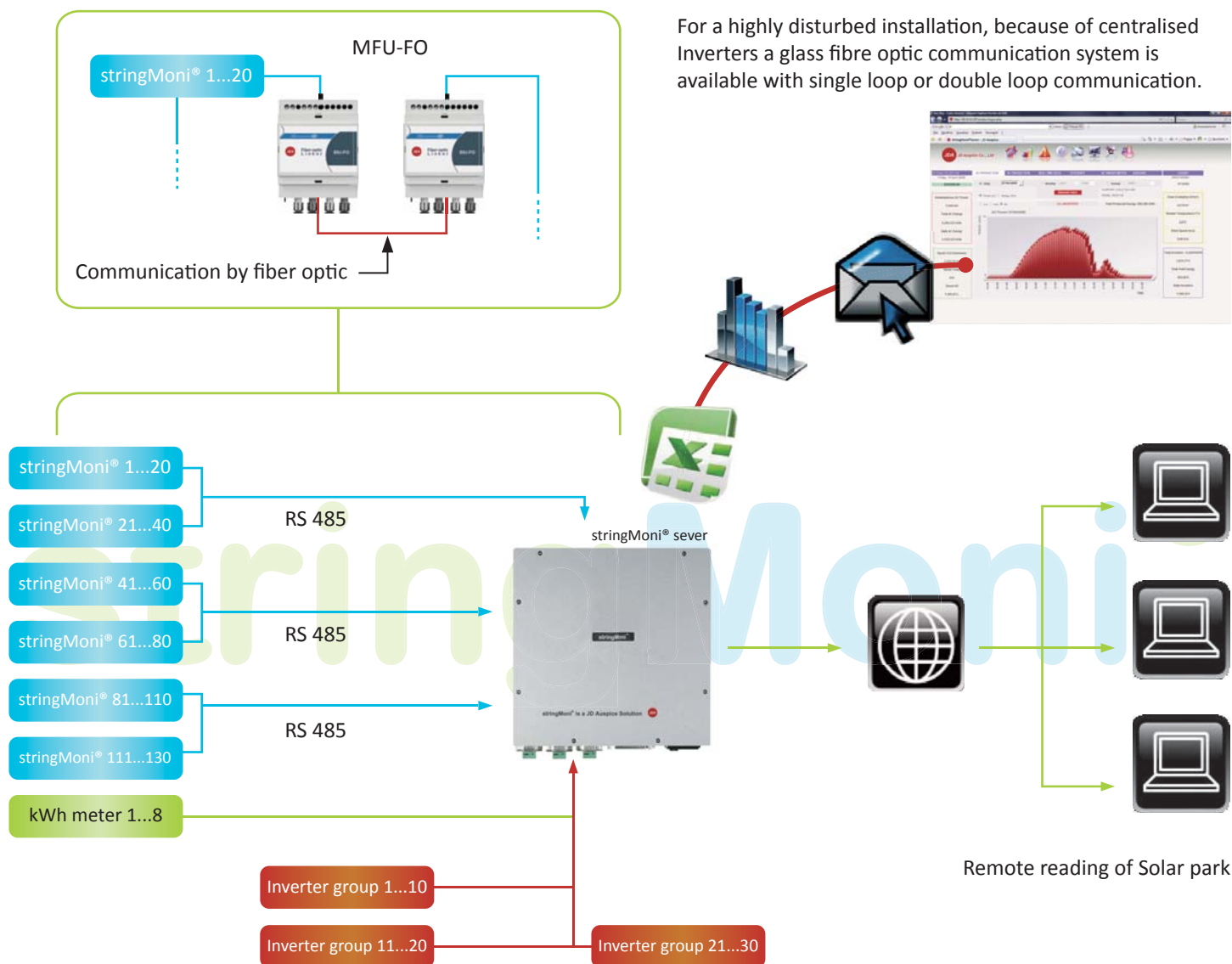
1 VIM-ML, up to 15 VIM-S0, up to 2 VIM-O, up to 1 VIM-P but not exceeding 16 units in total.

If an isolation to earth up to 1000VDC (instead of standard 800VDC) is requested, one VIM-1 can be added between the VIM-S/VIM-S0 group of units and all the other units, in this latter case the total number of units cannot exceed 17.

Sever

The String comprehensive monitoring solution

Monitoring solution based on embedded web-server for PV farms up to 5MWp

**This architecture can manage up to :**

- 130 stringMoni® (9600 bps communication speed and 10 min time interval), see also string-boxes
- 30 Inverters (depending on inverter's communication speed)
- 8 energy meters

Compatibility to :

- stringMoni® solution
- JD Auspice and more than 20 different Inverter manufacturers
- JD Auspice and other energy meters

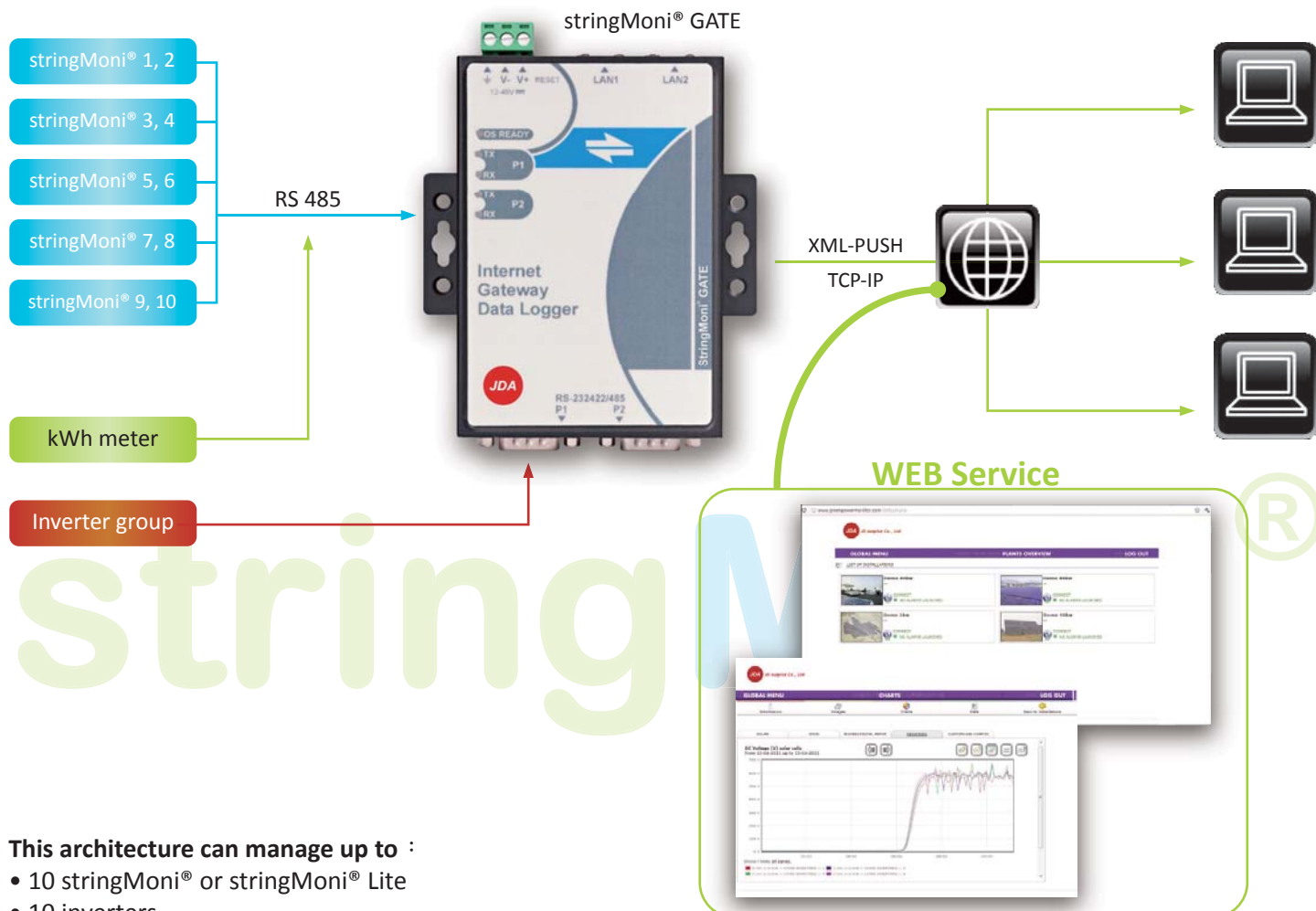
Overall features :

- Plant information.
- Plant map for failure localization.
- Webcam management.
- Real-time display with alarm indication.
- Graphical and analytical yield trends.
- Alarm and events logging.
- Extremely high level of data reliability and management because of local stringMoni® data logging and stringMoni® sever centralised data logging. In case of stringMoni® failure the data is available in stringMoni® sever and vice versa.
- 100 to 240VAC power supply
- Wall/DIN-rail mounting type

GATE

The stringMoni® comprehensive monitoring solution

Monitoring solution based on web-service protocols for PV installations up to 200kWp



This architecture can manage up to :

- 10 stringMoni® or stringMoni® Lite
- 10 inverters
- One energy meter

Compatibility to :

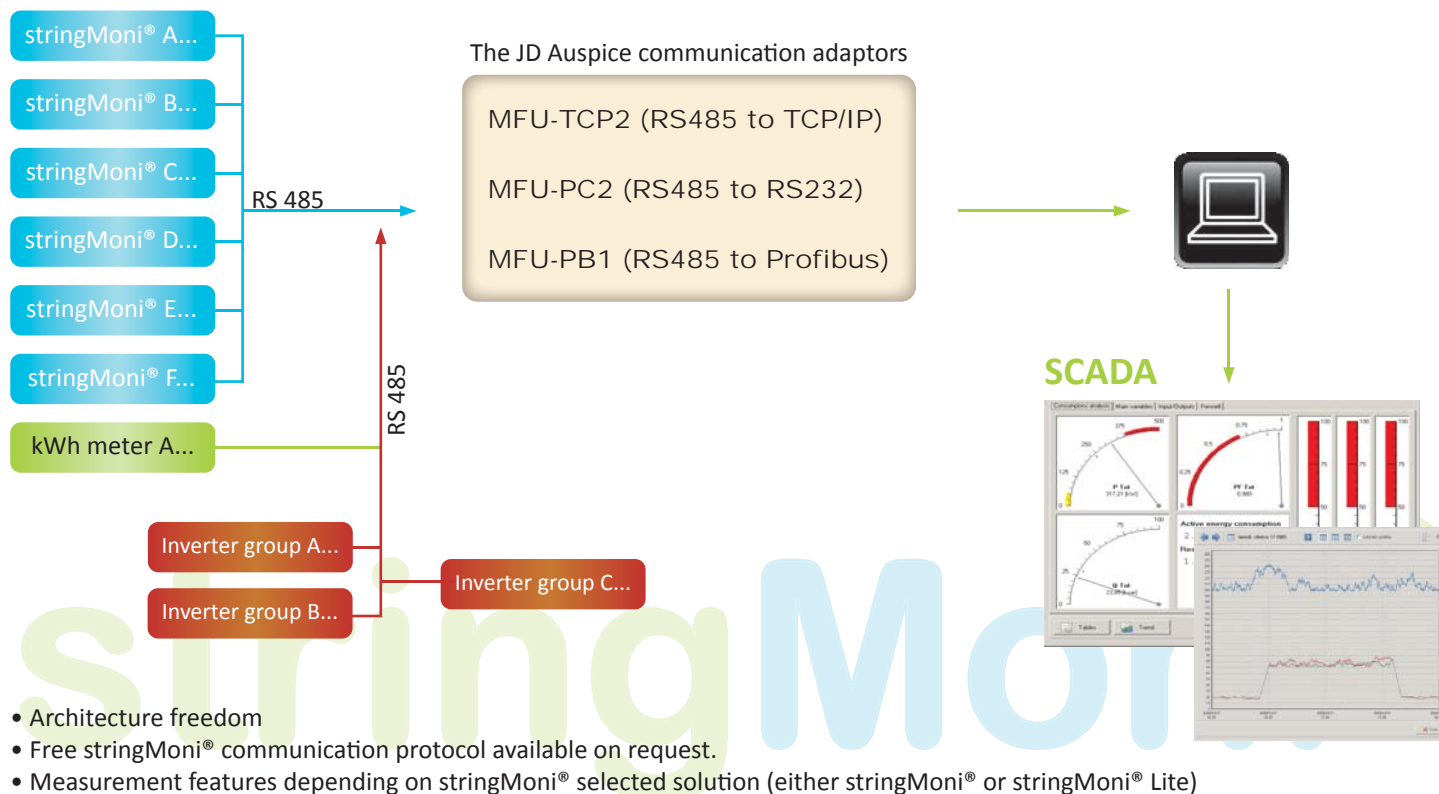
- stringMoni® solution
- stringMoni® Lite solution
- JD Auspice and other Inverter manufacturer
- JD Auspice energy meters
- Fat Spaniel Insight Platform portal
- Fat Spaniel Solar Vision portal

Overall features :

- Plant information based on available portal services (alarms, graphical and analytical yield trends)
- Data polling (measurements and alarms) from different site devices transmitted to a remote web-server by means of internet, using web-services to avoid firewall related issues
- Use of "XML" (Extensible Markup Language) based communication protocols granting high degree of flexibility, allowing stringMoni® Gate to push data to multiple monitoring portals, like the JD Auspice Web Portal and the Fat Spaniel® Web Portal
- 12 to 48 VDC power supply
- Wall/DIN-rail mounting type

The String comprehensive monitoring solution

Monitoring solution based on embedded web-server for PV farms up to 5MWp



MFU-FO the solution in case of high electrical disturbed environment

This unit converts the standard ModBus communication from RS485 wired to fibre-optic type with the aim to increase the communication distance and provide an extremely high communication immunity in case of combined centralised inverters, stringMoni® sever or other equivalent devices.



Overall features

- RS485 to glass fibre optic adaptor
- Dual way communication capability (wire to fibre optics and fibre optics to wire)
- Fibre optic single loop communication (cascade connection : communication loss in case of loop cut)
- Fibre optic dual loop communication (dual cascade connection : partial communication loss in case of one loop cut)
- Fibre optic dual loop communication (redundant communication : no communication loss in case of one loop cut)
- 10 to 24VDC/12 to 18 VAC power supply
- DIN-rail mounting type

Fibre type and communication distances :

- Single-mode and multimode glass fibre optic compatibility
- Point to point distance up to 800m with 50/125 µm multimode fibre
- Point to point distance up to 2000m with 62.5/125 µm multimode fibre

Antitheft

The stringMoni® comprehensive monitoring solution

Increase the security of your PV plant adding the specific stringMoni® antitheft solution

stringMoni®, in addition to all remarkable features can also be provided with an antitheft system which allows you to protect the whole PV installation, particularly when it is a ground mounted type. This security system is based on a cost effective plastic fibre optic technology which is easy to install and doesn't need expensive and specific fibre optic mounting skills. The optical sensing part is represented by VIM-ANTI which provides a theft alarm as soon as the plastic fibre, in its sensing loop, is broken because of PV panel removal attempt.



VIM-O.AT and VIM-ANTI overall features :

- Every stringMoni® (string-box) can manage up to 3 VIM-ANTI modules in combination with VIM-O "ANTI" with one relay output.
- The maximum in allowed length the fibre optic is 200m/VIM-ANTI
- The theft status is managed by the VIM-M unit which transmits the status to management system by means of the RS485 communication port (either wired or glass fibre optic based)
- VIM-ANTI sensor power supply from StringMoni® solution
- PFO22.1000:fibre optic roll of 1000m

VIM-ANTI sensors in an stringMoni® context

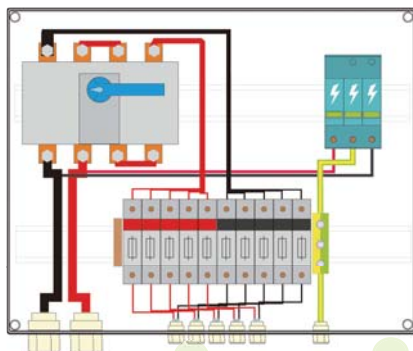


Retrofit solution

Adding a control solution is now easy!

Replacement of standard “positive” fuse holders with same space stringMoni® VIM-M and VIM-S solution providing a cost effective control without need of replacement of existing string box. Full local variable measurement with data and local switch disconnecter trip alarm and surge protection status logging for an efficient and effective string and plant control. String box with switch disconnecter, surge and fuses protection with measurements of V-A-kW-kWh (VIM-S), cell-air temperatures-irradiation-wind speed (VIM-P) and extended control features (VIM-O).

Existing String-Box



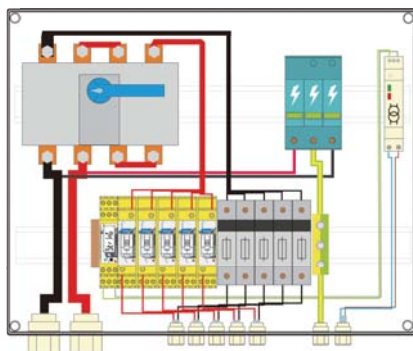
String box with switch disconnecter, surge and fuses protection.

Benefits

Apparently cheap solution, which become very expensive, in a large installation, because of the long fault searching time and the relevant missed production.

1. DC switch disconnecter
2. Surge arrester
3. Fuses

Retrofitted String-Box



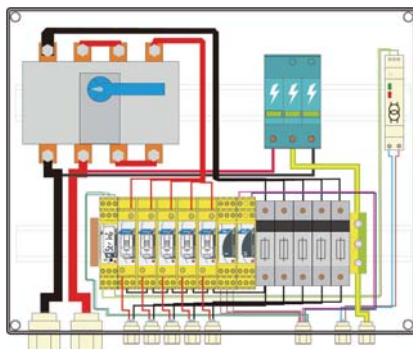
String-box with switch disconnecter, surge and fuses protection with added measurement features.

Benefits

Replacement of standard “positive” fuse holders with same space stringMoni® VIM-M/ML and VIM-S/S0 solution providing a cost effective control without need of replacement of existing sting box.

4. Power supply
5. stringMoni® or stringMoni® Lite

Advanced String-Box



String box with switch disconnecter, surge and fuses protection with measurements of V-A-kWkWh (VIM-S), cell-air temperatures, irradiation, wind speed (VIMP) and extended control features (VIM-O).

Benefits

Full local variable measurement with data, protection-trip alarms and surge protection status logging for an efficient and effective string and plant control.

6. stringMoni®
7. Antitheft

Compare and refine your investment

The main differences between the two monitoring solutions

Modules	Function and Features	stringMoni [®] Lite	stringMoni [®]
All	Modular concept	✓	✓
VIM-M Units Manager	12 to 28VDC power supply	✓	✓
	RS485 communication port (max. 115.2 kbit/s)	✓	✓
	Programming of communication speed and address	✓	✓
	Local display with programming pushbutton	✓	✓
	Measurement of single current from VIM-S only	✓	✓
	Alarm management on measured variables	✓	✓
	Local bus-configuration errors control	✓	✓
	Current string monitoring	✓	✓
	Power string monitoring		✓
	String efficiency		✓
	Event-logger: variables, functions and system alarms		✓
	Data-logger: V, A, W, Wh, PV cell temperature, air temperature, irradiation		✓
	First digital input (energy counting)		✓
	First temperature input or temperature input: Pt100/Pt1000 (2 or 3 wire)		✓
	Second digital input or temperature input: Pt100/Pt1000 (2 or 3 wire)		✓
	Clock		✓
VIM-S String Control Unit	Local status monitoring by means of LED		✓
	6-DGT data format for energy		✓
	4-DGT data format for instantaneous variables	✓	✓
	Integrated fuse holder (not available for 30A string input)	✓	✓
	String voltage measurement up to 1000VDC (+/-) (0.5% RDG)	✓	✓
	String current measurement up to 16ADC (0.5% RDG)	✓	✓
	String current measurement up to 30ADC (0.5% RDG)	✓	✓
	String power measurement (1.0% RDG)		✓
	String energy measurement (class 1)		✓
	Fuse blow alarm		✓
	Fuse temperature alarm	✓	✓
	Wrong connection (reverse current or voltage)	✓	✓
VIM-1	Isolation-enhancement unit which increases the string input to earth voltage from 800VDC to 1000VDC	✓	✓
VIM-P Environment Measuring unit	Irradiation sensor input: max. 120mV or max. 20mA DC	✓	✓
	First temperature probe input: Pt100/Pt1000 (2 or 3-wire)	✓	✓
	Short/open circuit on probe inputs	✓	✓
	Second temperature probe input: Pt100/Pt1000 (2 or 3-wire)		✓
VIM-O Inputs / Outputs unit	Wind speed sensor measuring input		✓
	First relay output activated by local alarm	✓	✓
	First relay output managed as remote command		✓
	Second relay output activated by local alarm		✓
	Second relay output managed as remote command		✓
VIM-ANTI Antitheft control	First digital input		✓
	Second digital input		✓
	Antitheft control based on fibre optic		✓
	Up to 3 fibre optic sensors (200m each loop)		✓
	VIM-O-ANTI I/O unit (3 digital inputs/one relay output) for VIM-ANTI sensor		✓

NOTE

stringMoni®



stringMoni®



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