FLEX-MPPTs PV Inverters

PVMate 4600MS / 3800MS / 3300MS

Modern Technology for a Sustainable World

MOTECH INSTRUMENTS

Product features, advantages, and benefits

Competitive comparisons (1/2)

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Manufacturer	MOTECH	SMA *	Fronius *	KACO *
Model	PVMate 4600MS	Sunny Boy 5000TL HC	IG 60 HV	4500xi
Input data (DC)				
Nominal PV power (Max)	4.84kW (5.37kW)	4.8kW (6.0kW)	4.95kW (6.7kW)	4.8kW (6.0kW)
MPP voltage range (eff.)	100~450V	125~750V	150~400V	350~600V
MPP Trackers)	1~3	2	1	1
Maximum input voltage	500VDC	750VDC	530Vdc	800Vdc
Nominal rated current (Max)	30A (10A x 3)	22A (2 x 11A)	17.67A (35.84A)	11.7A(16.6A)
Output data (AC)				
Grid voltage	230VAC (±15%)	220~240 VAC	183Vac~264Vac	190Vac~254Vac
Grid frequency	60/50Hz (±1Hz)	49.8~50.2Hz	60/50Hz	47.5~50.2Hz
Nominal AC power (Max)	4.6kW (5.1KW)	4.6kW (5kW)	4.6kW (5kW)	4.6KW(5.06KW)
Maximum AC current	22A	22A	21.74A	22A
Power factor	0.99	-	-	-
THD	< 3%	< 4%	< 3.5%	< 3%
Maximum efficiency (European)	96.3% (95.4%)	96.2% (95.5%)	94.3%(93.5%)	96.3%(95.3%)
Stand by power	< 0.4W	< 10W	12W	< 11W
Phase	Single	Single	Single	Single

* Source: PHOTON International, April 2006 issue.

Competitive comparisons (2/2)

MOTECH
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MOTECH INSTRUMENTS

Manufacturer	MOTECH	SMA *	Fronius *	KACO *
Model	PVMate 4600MS	Sunny Boy 5000TL HC	IG 60 HV	4500xi
General				
Operating Temperature	-20~60℃ (de-rated starts at > 55℃)	-25~60℃ (de-rated starts at > 45℃)	-20~50℃ (de-rating data is n/a)	-25~40℃ (de-rated starts at > 40℃)
On/Off control	Automatic	Automatic	Automatic	Automatic
Warranty	5 years	5 years	5 years	5 years
Enclosure	IP65 (electronics IP65)	IP65	IP 21, opt. IP45	IP54
Cooling	Controlled forced ventilation	Natural	Controlled forced ventilation	Natural
Weight	23kg	31kg	16kg	28kg
Dimensions (cm)	580x422x182 (mm)	490x470x225 (mm)	439x435x295 mm (Outdoor) 610x644x120 mm (Indoor)	660x340x220 (mm)
Display	LED/LCD	LED/LCD	LED/LCD	LCD
Communication Interface	RS232C/RS485	RS232/RS485	RS232/RS485	RS232/RS485

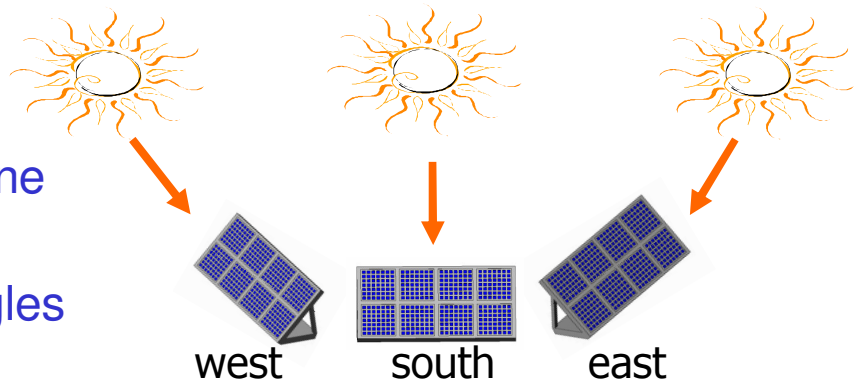
* Source: PHOTON International, April 2006 issue.

Motech FLEX-MPPTs technology

- FLEX-MPPTs is a technology that is unique to Motech PV inverters. With this technology, the user has the **flexibility** to configure the inverter to operate in either of these two following modes.
- Mode 1: Multiple panel string mode
  - Under this mode, each DC string has its own Maximum Power Point Tracker (MPPT) to optimize the efficiency. This mode is used if one single PV inverter monitors multiple PV strings in applications such as BIPV.
- Mode 2: Master / Slave mode
  - Under this mode, Motech inverter operates at a higher efficiency when the insolation is low.

Reasons for inverters with 3 MPP trackers

- For countries located in northern hemisphere, sun passes through three different orientations each day.
  - East, south, west
- Inverters with 3 MPP trackers allows one tracker for each PV string
  - Tracking of different irradiation angles
  - Increases the energy yield via the reduction of mismatching and partial shading losses
  - More flexibility, expandability
  - One single inverter monitors multiple PV strings

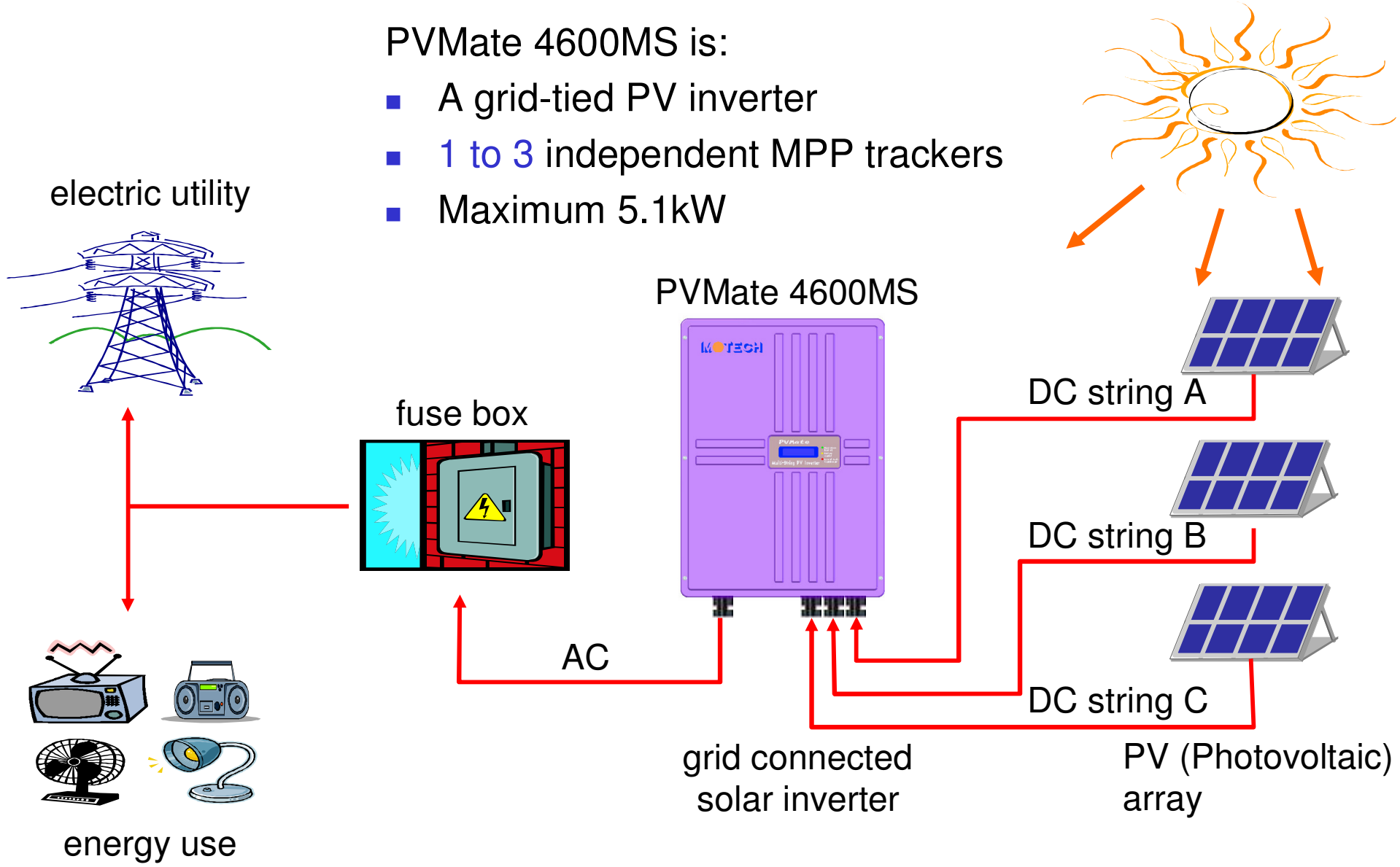


building integrated PV

Motech PVMate 4600MS

PVMate 4600MS is:

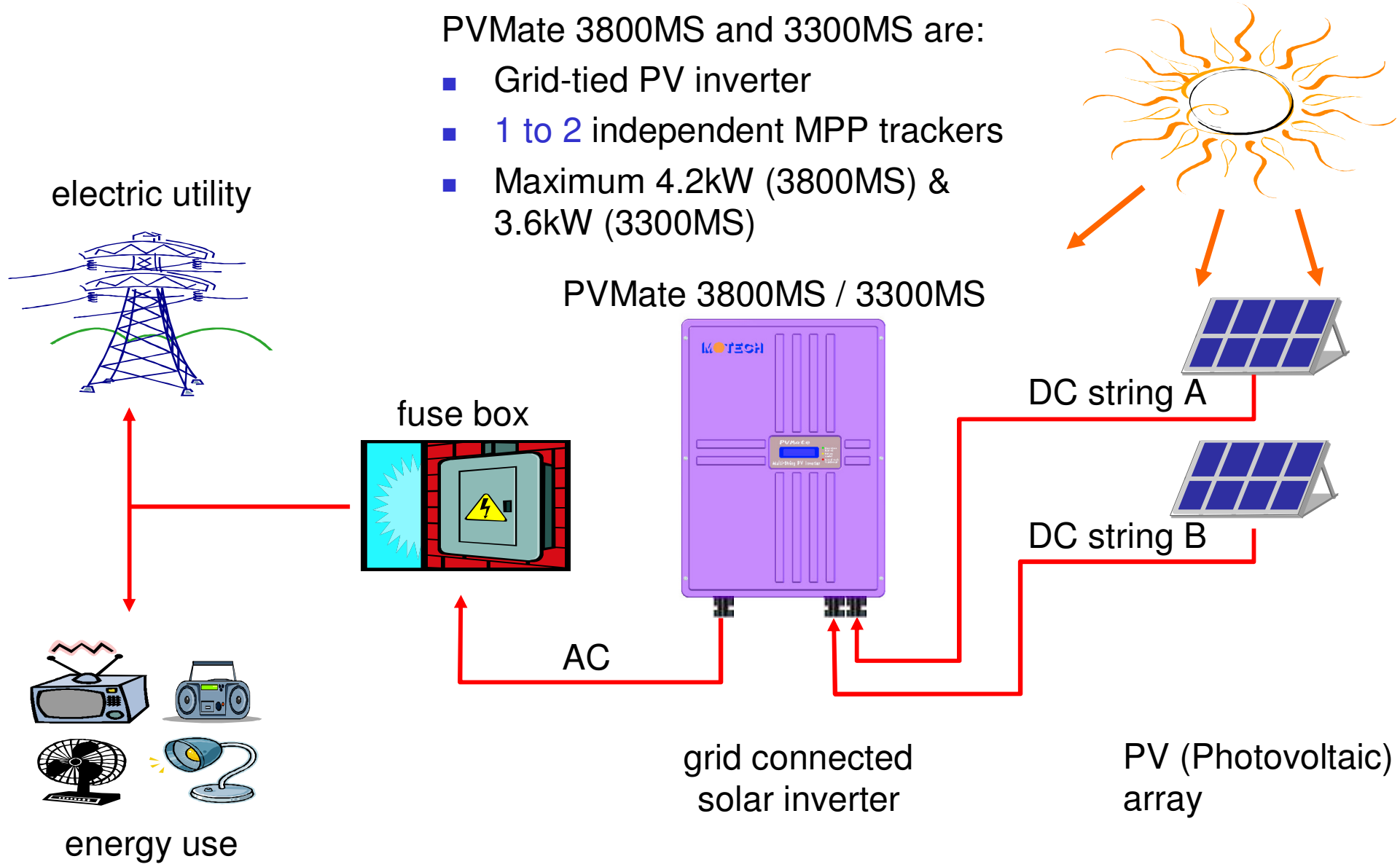
- A grid-tied PV inverter
- 1 to 3 independent MPP trackers
- Maximum 5.1kW



Motech PVMate 3800MS / 3300MS

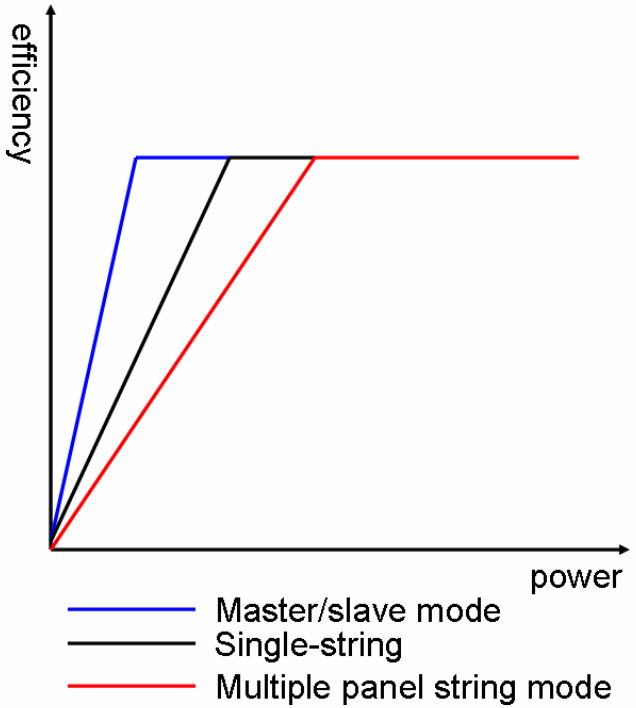
PVMate 3800MS and 3300MS are:

- Grid-tied PV inverter
- 1 to 2 independent MPP trackers
- Maximum 4.2kW (3800MS) & 3.6kW (3300MS)



Master & slave mode

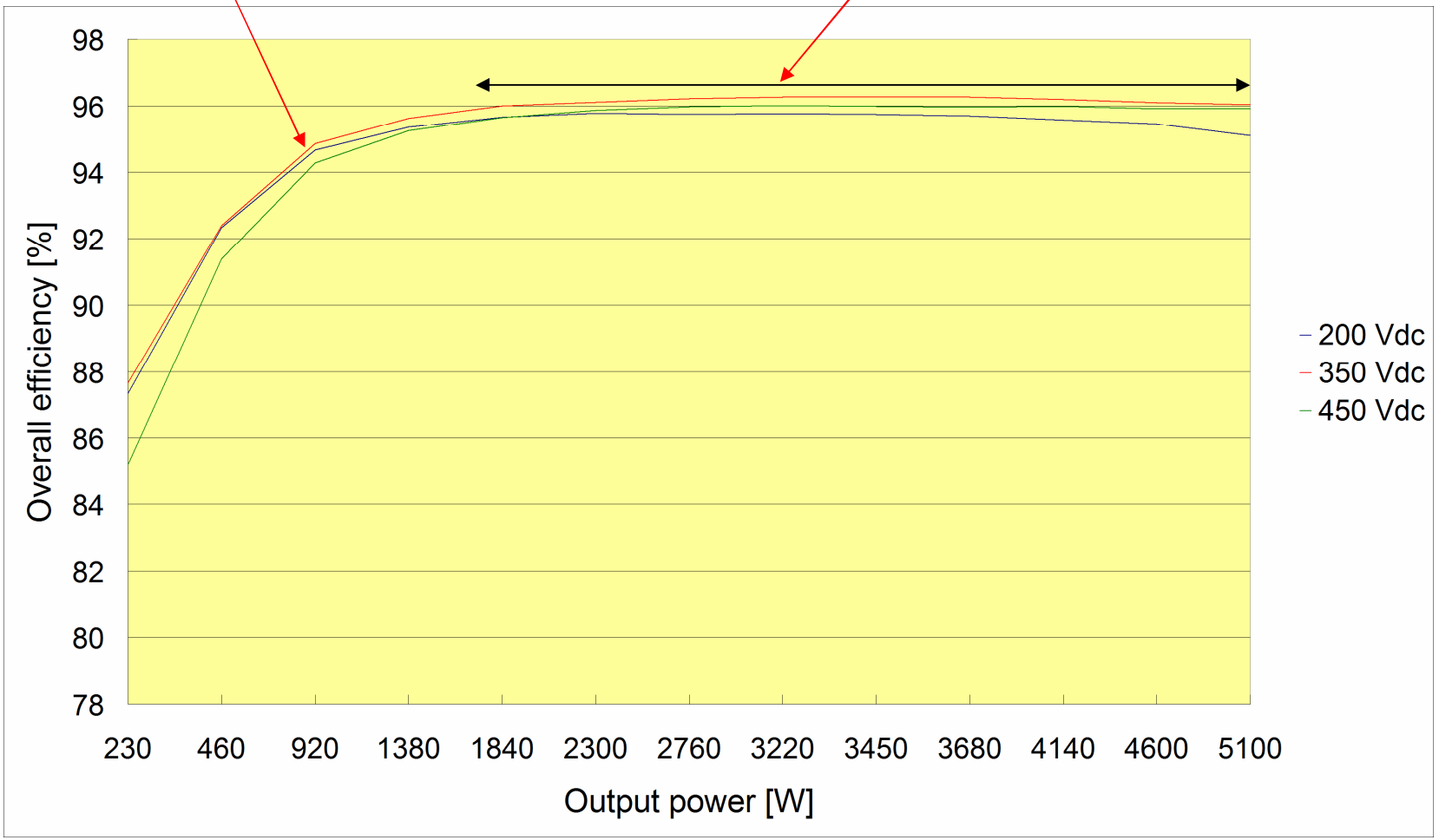
- Master / slave mode is a proprietary Motech technology that allows PVMate 4600MS to operate at a higher efficiency when the insolation is low.
- For PVMate 4600MS, a total of three strings are supported. Two or three strings could be connected in parallel by altering the jumper setting.
- Not all the strings attached to the inverter have the same intensity during day time. When that situation occurs, PVMate would compensate and distribute the current across the strings that are connected in parallel, in order to achieve the best efficiency for these strings.



PVMate 4600 efficiency

At 1kW output power, Motech inverter has an efficiency of 95% at 200 Vdc and 350 Vdc.

Motech PVMate 4600MS inverter has a consistent efficiency of greater than 96% from 1.7kW to 5.1kW (350 Vdc).

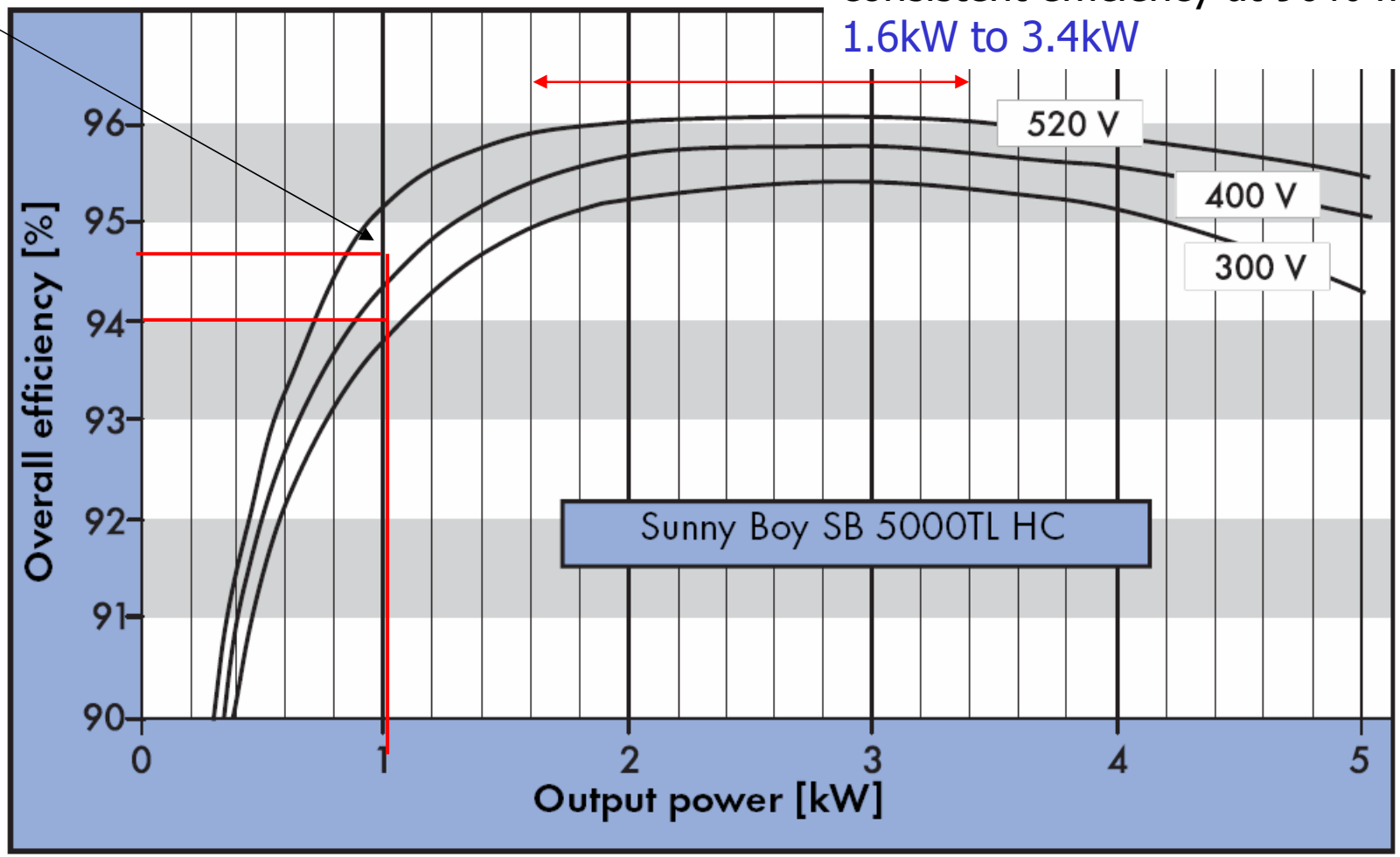


Even at low irradiation of 1kW, PVMate 4600 still maintains a high efficiency of 95%.

SMA SB 5000TL HC efficiency

At 1kW output power, SMA inverter has an efficiency of 94% (350V) and 94.6% (450V).

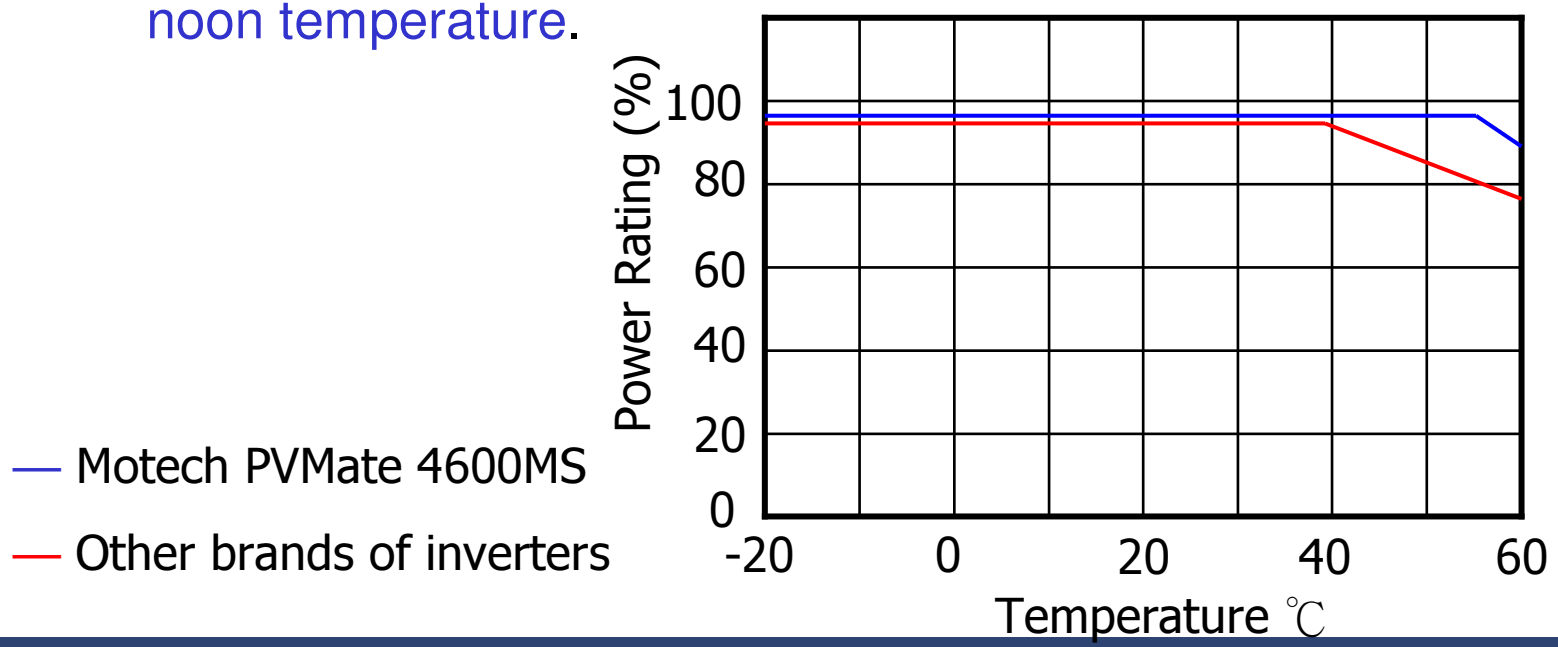
SMA SB 5000 TL HC has a consistent efficiency at 96% from 1.6kW to 3.4kW



Therefore, Motech inverter is more efficient than that of SMA inverter at 1kW.

Derating (1/2)

- “Derating” operating mode is a type of normal operating mode that occurs from time to time.
- Temperature derating – in the temperature derating mode, the temperature monitor in the inverter has reduces the output performance to prevent the inverter from overheating.
- The typical inverters on the market starts to de-rate when the temperature exceeds 40℃. This condition is easily reached at noon temperature.



Derating (2/2)

- MOTECH PVMate 4600MS does not experience any derating at temperature up to 55℃.
- This unique feature translates into following advantage and benefits.
  - **More efficient** → generate more power
  - **More efficient** → lower in case temperature → less heat generated → more reliable → less downtime & longer life span
  - **More efficient** → lower in case temperature → less heat generated → a smaller heat sink is required → lighter weight → lower BOM cost → lower price → more competitive in the market

Superior heat dissipation solution

- In an internal test performed by Motech Instruments, an inverter from one of leading brands is measured to have an inner temperature at 69.4℃ during operation.
- In comparison, Motech PVMate 4600MS has an inner temperature of 55.7℃.
- That is a whopping difference of 13.7℃ (= 69.4℃ - 55.7℃).
- Inverter reliability has an impact on life-cycle cost. Efforts targeting inverter cost reductions should consider reliability improvements.
  - The inverter accounts for 10-20% of the initial system cost.
  - Investment in a new inverter is required 3-5 times over the life of a PV system.
- A typical PV system has a life span of 25 years, and the longer that an inverter lasts, the lower TOC (total cost of ownership).
- Lower in case temperature → less heat generated → more reliable → less downtime & longer life span → a lower TCO for the life span of PV system

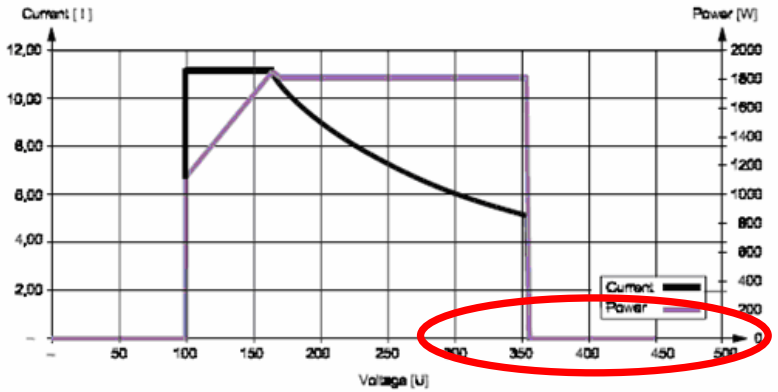
PVMate 4600MS could reduced the TCO for a PV system.

Anti-islanding support

- To prevent injury to utility personnel working on power lines, power from PVMate 4600MS to the electric panel at home is shut off immediately when there is a utility outage. No power is allowed to flow out of the inverter into the utility grid from the system.
- This means that the house will have no electric power, either from the solar panels or from the utility, during a utility outage.
- Motech inverters are designed with “active anti-islanding detection” technology, which actively monitors the electricity grid to determine if the grid is on or off.
- PVMate 4600MS will automatically re-start when utility power is restored.

Full MPPT support

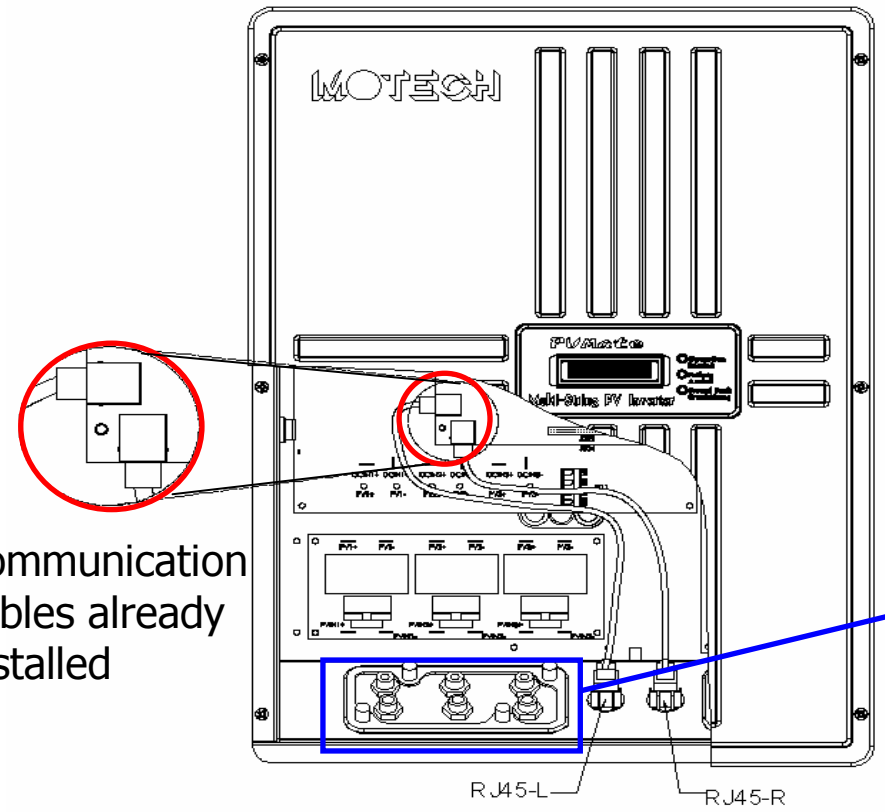
- PVMate 4600MS has a fully functional MPP range
  - From 100Vdc to 450Vdc
  - This MPP range applies to PV modules that are made up of 4”, 5”, and 6” cells
- The maximum DC voltage supported by PVMate 4600MS is 500Vdc
  - At voltage that exceeds 450Vdc, PVMate 4600MS still functional but its MPP feature will cease to function
- In comparison to the competitive offering, some inverters cease to be functional at voltage that exceeds 360Vdc (see the chart below).



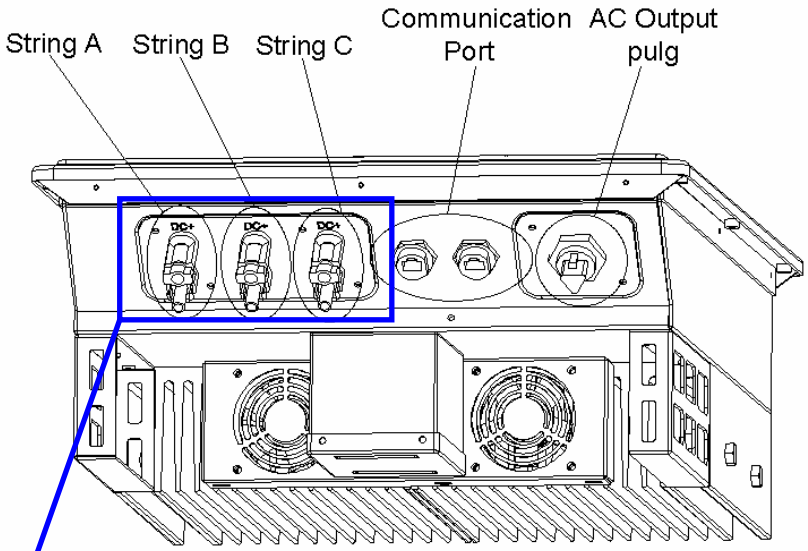
Visually appealing LED and LCD display

- LED display
  - Three LED's to show the operating status during operation.
- LCD display
  - a 16 x 2 LCD to show the operating status, input/output data, and error messages (16 characters per line and a total of 2 lines)
  - In addition to the standard information that are displayed on the LCD, it also displays an indicator for "low insolation" when it occurs. This feature is not available in our competitor's products.

Easy and flexible cabling



Communication cables already installed



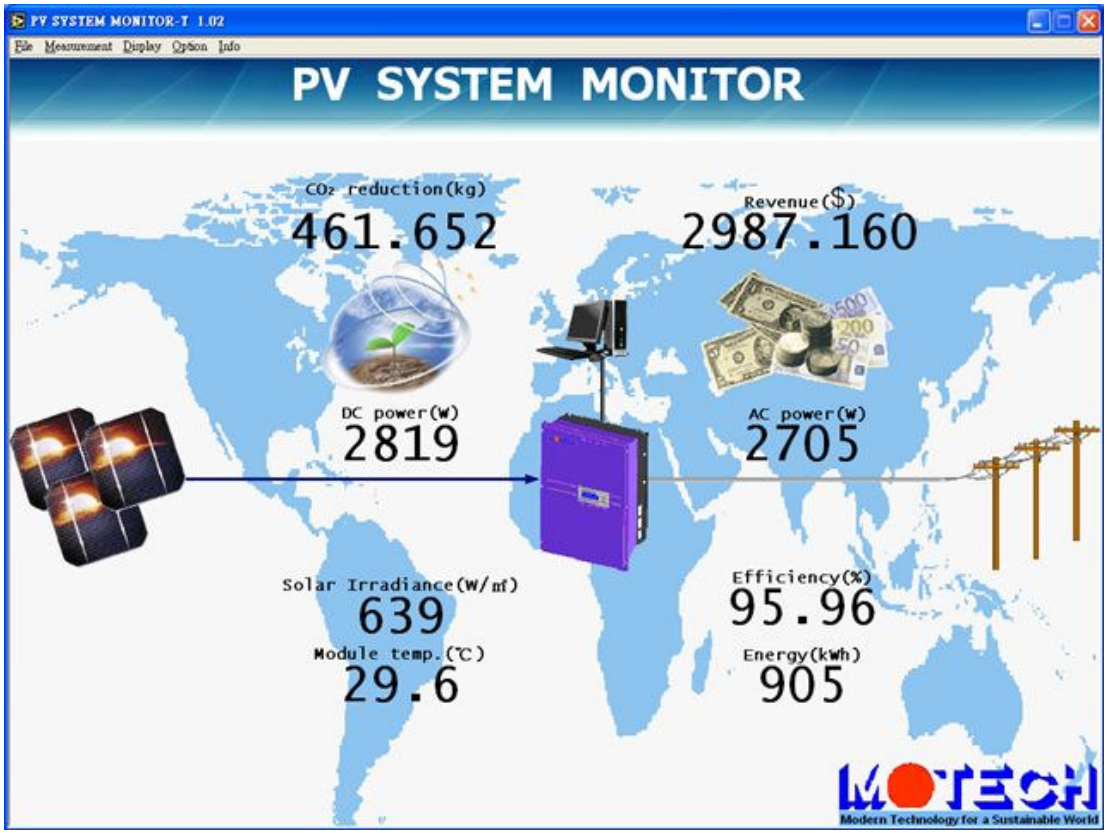
DC connector module

- Unlike SMA SB5000 TL, PVMate 4600MS does not required the installer to open the case and install communication cables. The cables are already installed in the factory. Simple plug in DC cables into PVMate 4600MS and it works.

- PVMate 4600MS is designed to have a DC connector module that is replaceable.
- For customers who use different cable connectors, Motech could customized a DC connector module for different cable connectors.

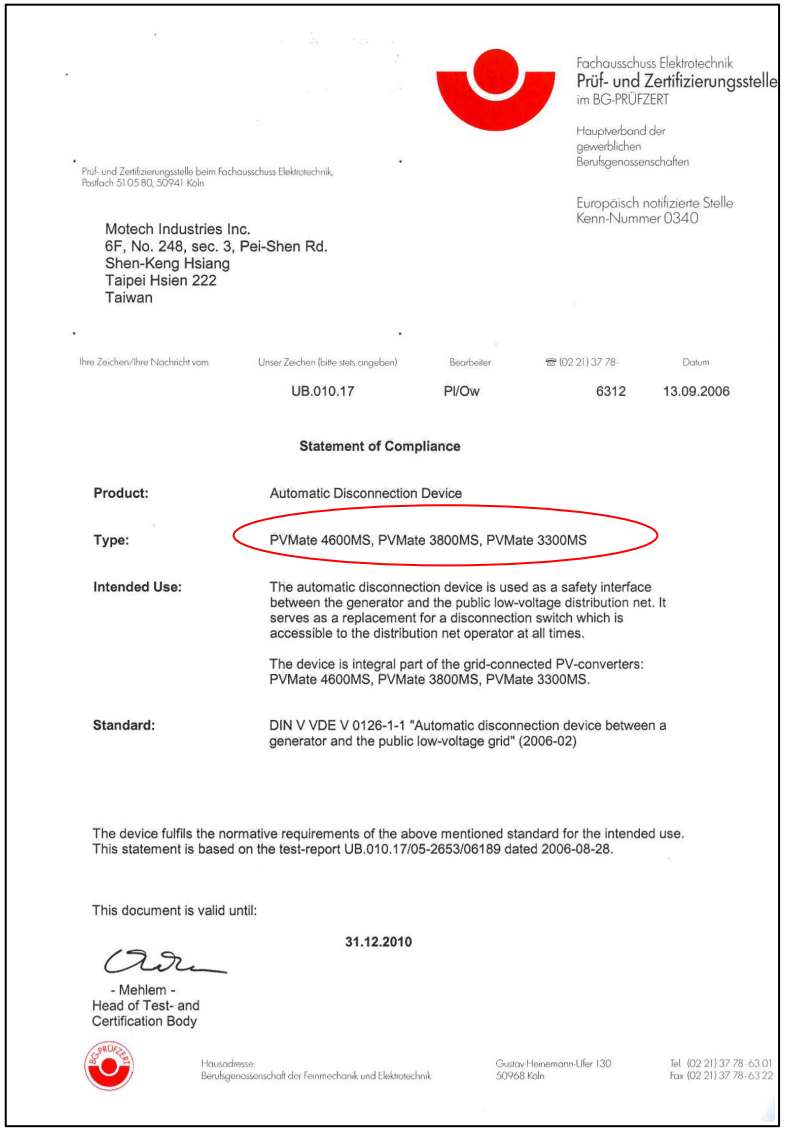
Communications and diagnostics features

- Each model of PVMate series comes with a software called "PV SYSTEM MONITOR". This software does the following tasks.
  - Process the data sent by the inverter
  - Allows quick diagnostic when the system is not operating properly
  - Allows the user to adjust system parameters for optimal operation



Safety certifications

- PVMate 4600MS satisfied the following requirements.
  - RoHS
  - CE
  - VDE0126-1-1 (RCMA)



Fachausschuss Elektrotechnik
Prüf- und Zertifizierungsstelle
im BG-PRÜFZERT

Hauptverband der gewerblichen Berufsgenossenschaften

Europäisch notifizierte Stelle
Kenn-Nummer 0340

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Ihre Zeichen/Ihre Nachricht vom	Unser Zeichen (bitte stets angeben)	Bearbeiter	☎ (02 21) 37 78-	Datum
	UB.010.17	PI/Ow	6312	13.09.2006

Statement of Compliance

Product: Automatic Disconnection Device

Type: PVMate 4600MS, PVMate 3800MS, PVMate 3300MS

Intended Use: The automatic disconnection device is used as a safety interface between the generator and the public low-voltage distribution net. It serves as a replacement for a disconnection switch which is accessible to the distribution net operator at all times.

The device is integral part of the grid-connected PV-converters: PVMate 4600MS, PVMate 3800MS, PVMate 3300MS.

Standard: DIN V VDE V 0126-1-1 "Automatic disconnection device between a generator and the public low-voltage grid" (2006-02)

The device fulfils the normative requirements of the above mentioned standard for the intended use.
This statement is based on the test-report UB.010.17/05-2653/06189 dated 2006-08-28.

This document is valid until:

31.12.2010

- Mehlem -
Head of Test- and Certification Body

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VDE0126-1-1 certificate

Specifications for PVMate 4600MS / 3800MS / 3300MS (1/2)

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Model	PVMate 3300MS	PVMate 3800MS	PVMate 4600MS
Input data (DC)			
MPP voltage range	100~450V		
Max. input voltage	500VDC		
Max. input current	20A (10A x 2)	20A (10A x 2)	30A (10A x 3)
Output data (AC)			
Grid voltage	230VAC (±15%)		
Grid frequency	60/50Hz (±1Hz)		
Nom. AC power (Max power)	3.3kW (3.6kW)	3.8kW (4.2kW)	4.6kW (5.1kW)
Max. AC current	16A	18.2A	22A
Waveform	True sine		
Power factor	0.99		
THD	<3%		
DC current injection	<0.5%		
Max. efficiency (EU)	96.3% (95.2%)	96.3% (95.2%)	96.3% (95.4%)
Stand by power	<0.4W		
Phase	Single		

Specifications for PVMate 4600MS / 3800MS / 3300MS (2/2)

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Model	PVMate 3300MS	PVMate 3800MS	PVMate 4600MS
General			
Relative humidity	Max. 95%		
Operating Temperature	-20~55℃ (No de-rated)		
On/Off control	Automatic		
Warranty	5 years		
Enclosure	IP55 (Electronics IP65)		
Cooling	Controlled fan		
Weight	23kg		
Dimensions	580x422x182 (mm)		
Display	LED/LCD		
Communication	RS232C/RS485		
Software	Solar Monitor		
Compliance			
Safety Standard	EN 50178		
EMC immunity	EN 61000-6-2		
EMC emission	EN 61000-6-3		
Harmonic & Flicker	EN 61000-3-2 A14 & -3-3		
Grid Control	VDE 0126-1-1		

Thank you!


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