

PV monitoring solutions

Outdoor monitoring system for PV modules

Accurate

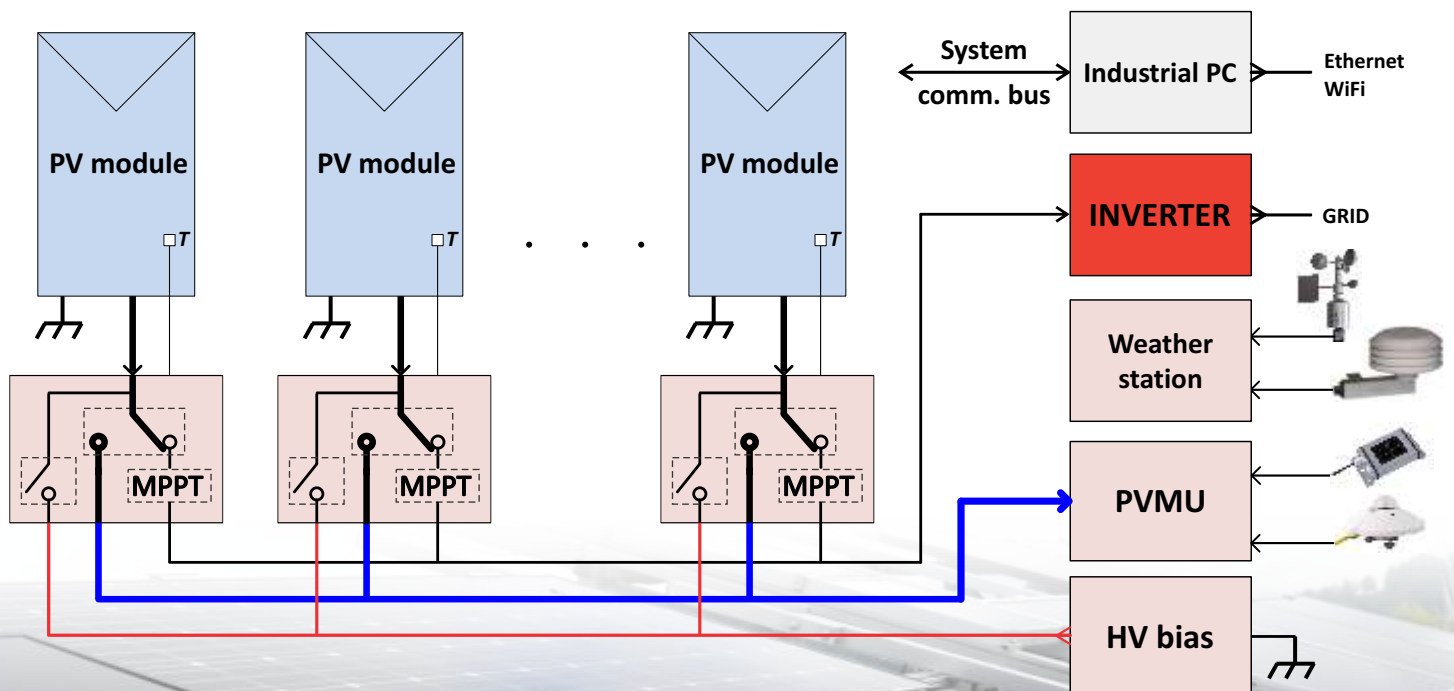
- Four wire connection for each PV module
- Simultaneous IV curve & irradiance measurement
- Spectrally matched reference irradiance sensors
- Adjustable IV scan time per each PV module

Versatile

- Configurations of multiple of 16 input channels for PV modules
- Open/Short circuit or MPP load conditions
- Bias voltage source for PID testing up to ± 1500 V
- MODBUS® interface for pyranometers

Powerful

- MPP tracking of PV modules up to 200 V / 17 A / 550 W
- Grid connected system – no energy is wasted
- Simultaneous parameters acquisition of all PV modules
- Fast consecutive IV curve scanning



MAIN SYSTEM PROPERTIES

- Each PV module is connected to a MPP tracker. Energy is fed to the grid via inverters.
- Simultaneous MPP tracking and current, voltage and temperature data logging of all PV modules.
- Sequential IV curve scanning with PV measurement unit on time intervals.
- Simultaneous IV scan and reference irradiance measurement per each IV point.
- Adjustable high voltage supplies up to ± 1500 V for PID testing, optionally per each PV module.
- MODBUS® interface for pyranometers.
- Windows control software with SQL database data storage for post analyses.

PV MEASUREMENT UNIT (PVMU)

Measurement	Range	Resolution	Uncertainty	Temperature coefficient
PV voltage	250 V	3.8 mV	$\pm (0.1 \text{ mV} + 0.1\% \text{ FS})$	$< 0.005\% / ^\circ\text{C}$
PV current	20 A	152 μA	$\pm (2 \text{ mA} + 0.1\% \text{ FS})$	$< 0.01\% / ^\circ\text{C}$
	2 A	15.2 μA	$\pm (0.2 \text{ mA} + 0.1\% \text{ FS})$	$< 0.01\% / ^\circ\text{C}$
Irradiance sensors (6 channels)	1 V	7.63 μV	$\pm (10 \mu\text{V} + 0.1\% \text{ FS})$	$< \pm 2 \mu\text{V} / ^\circ\text{C}$
	40 mV	0.3 μV	$\pm (10 \mu\text{V} + 0.2\% \text{ FS})$	$< \pm 2 \mu\text{V} / ^\circ\text{C}$
Irradiance sensor temperatures	10 kOhm NTC, PT1000	1 $^\circ\text{C}$	$\pm 0.2\% \text{ FS}$	
IV curve scanning	Adjustable time from 10 ms to 1 s, with maximal of 400 points per IV curve			

MPP TRACKERS (MPPT)

		MP1010F-2	MP1017F2-3	MP2005F-2
Power input	Voltage	0 – 95 V	0 – 95 V	0 – 200 V
	Current	10 A	17 A	4.5 A
	Power	350 W	550 W	250 W
	Connection	4-wire	4-wire	4-wire
	Max. reverse current	10 A	18 A	6 A
	Min. input R (SC mode)	72 mOhm	32 mOhm	230 mOhm
	Euro efficiency	92.5 %	93.2 %	92.5 %
Bias input	Voltage	-1500 – +1500 V		
	Max. Current	± 25 mA	± 20 mA	± 25 mA
Power Output	Voltage	40 – 300 V, 250 V nominal		
	Max current	1.6 A	3.2 A	1.6 A
Bypass output	Max voltage	220 V		
	Max current	current pins: 10 A, voltage pins: 2 A		
Measurements	Input Voltage	0 – 102.4 V, res.: 25 mV	0 – 102.4 V, res.: 25 mV	0 – 204.8 V, res.: 50 mV
	Input Current	0 – 10.24 A, res.: 2.5 mA	0 – 20.47 A, res.: 5 mA	0 – 5.12 A, res.: 1.25 mA
	Output Voltage	50 – 410 V $\pm 15\%$, resolution: 100 mV		
	Bias Current	-1024 – +1024 μA , resolution: 0.5 μA		
	Internal Temperature	-25 – +120 $^\circ\text{C}$, resolution: 1 $^\circ\text{C}$		
	External Temperature	DS18B20 1-wire digital temperature sensors, -55 – +125 $^\circ\text{C}$, res.: 0.0625 $^\circ\text{C}$, up to 8 sensors		

WEATHER STATION

Measurement	Range	Resolution	Uncertainty
Air temperature	-40 – +123.8 $^\circ\text{C}$	0.01 $^\circ\text{C}$	± 0.4 $^\circ\text{C}$
Air humidity	0 – 100% RH	0.05% RH	$\pm 3\%$ RH
Air pressure	920 – 1150 hPa	1 hPa	$\pm 1.5\%$
Wind speed	0.5 – 60 m/s	0.1 m/s	± 0.5 m/s
Wind direction	0 – 360 $^\circ$	5 $^\circ$	± 5 $^\circ$

HIGH VOLTAGE BIAS SOURCE

Parameter	Range	Uncertainty
Output voltage	-1500 V – +1500 V (software limited)	40 mV noise + 0.5% FS
Current limit	20 mA (hardware limited), software adjustable	1 mA
Output current measurement	0 – 20 mA	1% FS

REFERENCES



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