

IMM TECHNOLOGY



YOUR SOLAR PLANT
AT YOUR FINGERTIPS

PL201808 EN V1.1

WHAT IS IMM?

IMM (Individual Module Monitoring) is an advanced solar plant monitoring at module level managed by artificial intelligence for smart Operation and Maintenance (O&M). It allows you to detect even smallest errors from module level up to the whole plant, to optimize the performances of the solar plant and to reduce the O&M costs by locating precisely each defect and providing a detailed and optimized maintenance plan.

WHY IMM?



It helps you track and identify technical issues in the whole plant down to the affected module. IMM's artificial intelligence pinpoints the „fingerprint“ of any technical defect down to module level.



It localizes precisely each problem, saving inspection costs and time. IMM allows you to visualize each module with its power output and exact location on the power plant, together with the diagnosed problem.



It reduces the number of interventions and increases their precision - IMM elaborates an optimized O&M intervention plan with clear instructions for operators, who can then act precisely on the detected issue



It puts you in control of your power plant - IMM provides you the comfort of knowing always and exactly how well your plant is performing thanks to full-rounded monitoring and extensive analysis



Sustainability and Innovation
Award at Electrolux Global
Brand Licensing Symposium

HOW IMM WORKS

IMM is enabled by a tiny sensor. The IMM Sensor is placed either in the junction box, as featured natively by AEG solar modules with integrated IMM Technology, or in a special plug-in box -IMM Upgrade- to be applied to existing solar modules. The sensor interactss with other system components:

SENSOR

Placed in AEG solar modules or in the IMM Upgrade, it measures voltage and temperature and sends the information with module serial number to the String Reader via the exisiging powerline cable.

STRING READER

Reads the module data and further measures string current and voltage, sending the data to the Gateway

GATEWAY

Receives the data from every String Reader and sends via any desired router to the Web Portal

WEB PORTAL

Analyses the data for the user. It does not only detect individual performance variations but can also pinpoint error patterns by means intelligent data analysis

THE IMM WEB PORTAL



Based on advanced artificial intelligence, the IMM Web Portal elaborates the live data collected by the sensors, analyzes with large databases and translates them into user-friendly visualizations and instructions to help the plant owner understand the performances of their power plant. Thanks to vast analysis capabilities based on comparison, simulation and „fingerprint tracking“ the system is able to precisely locate the issues generating yield loss.

At module level: Shadows / Voltage loss / Weak module / Defective diodes/ Defective module / Module offline

At string level: String offline / Weak string / Defective module / Module offline

At inverter level: Inverter offline/Inverter with reduced power / Inverter error code (reading and rating);

At plant level: Plant offline

SUGGESTED SETTINGS

Internet connection from PC

Browsers: Mozilla Firefox, Google Chrome (suggested)

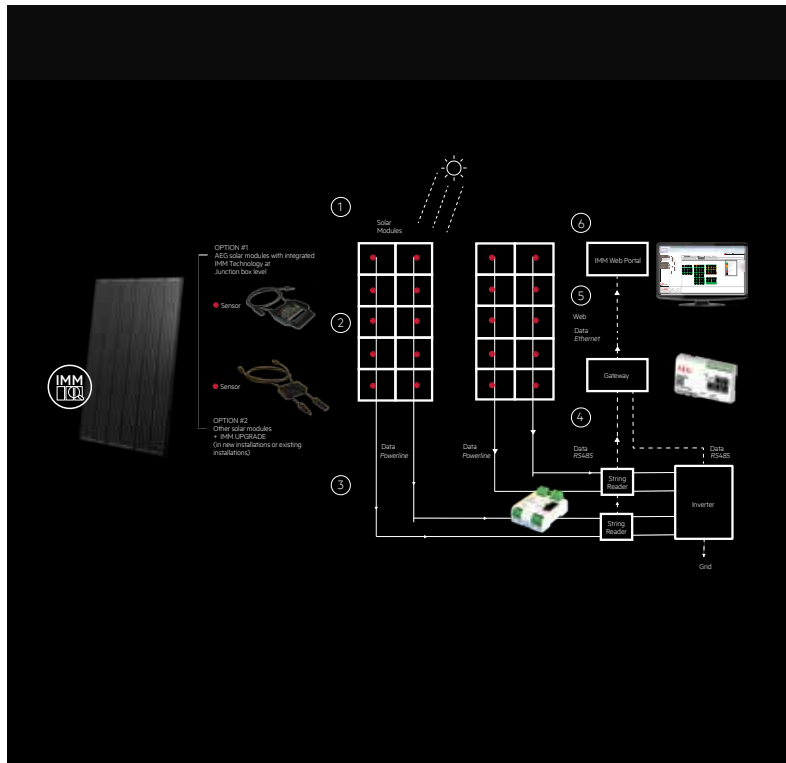
Screen settings: 1280 * 600 or higher resolution

TEST IMM TECHNOLOGY!

Request a demo at www.imm-portal.com

With the Web Portal, you can see at a glance how your plant is performing in real-time and over time, thanks to the live data conveyed by the IMM sensors which are monitored and constantly pushed to the system ´s records.

Thanks to a prompt warning system, IMM provides you with timely updates from remote when a yield-impacting issue is developing. Thanks to its user-friendly interface, you are able to understand from remote and at a glance - down to the module level- where exactly intervention is needed for bringing your power plant back to its optimum and organize any intervention in an efficient way. The system further simplifies tracking the maintenance actions made on the plant thanks to its practical fault management system and O&M action plan.



IMM SCHEME

1 - Irradiated by sunshine, the AEG solar modules with integrated IMM Technology/the existing solar modules with IMM Upgrade produce clean energy.

2- The IMM Sensors within the IMM junction box/within the IMM Upgrade measure the voltage of each module and the temperature of each junction box.

3- The data from the IMM Sensors are sent to the String Reader via Smart Powerline communication (existing DC cabling)

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5- The String Readers receive the data from the IMM Sensors and forward them to the Gateway. The String Reader too measures temperature, voltage and current.

6- The transmitted data of the String Reader are collected in the Gateway and sent via internet to the Web Portal.

THE IMM JUNCTION BOX



Native in AEG solar modules with integrated IMM Technology; features an IMM Sensor

Rated current (J/D)	14.5 A / 30 [A]
Rated voltage	IEC 1000 [V] / UL 600 [V]
Reverse current	25 [A]
Dimensions	140 x 128 x 25 [mm]
Temperature range	-40°C~ 85 [°C]
Cable size	4.0, 6.0 [mm ²] / 12, 10 [AWG]
Cable length	1000 [mm]
Protection degree	IP 65
Flammability clas	5VA
Junction box certification	EN 50548

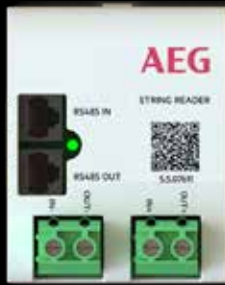
THE IMM UPGRADE



Plug-and-play to upgrade existing solar modules with IMM; features an IMM Sensor

Rated current (J/D)	14.5 A / 30 [A]
Rated voltage	IEC 1000 [V] / UL 600 [V]
Reverse current	25 [A]
Dimensions	100 x 67 x 20 [mm]
Temperature range	-40°C~+ 85 [°C]
Cable size	4.0 [mm ²] / 12 [AWG]
Cable length	50 / 900 [mm]
Protection degree	IP 67
Flammability class	5VA
Weight	0.09 [kg]

THE IMM STRING READER



For consistent data collection from the individual strings

Maximum string voltage (U_{STR})	1000 [V]
Maximum string current (I_{STR})	10 [A]
Maximum modules of PV modules per string (N_{MOD})	30
Power supply voltage (U_S)	24 [V]
Current consumption (I_{CONS})	24 [V] • 14 [mA]
Power consumption (P_S)	< 0.1 [W]
Dimension (LxWxH)	90.34 x 71.90 x 41.74 [mm]
Communication interface	RS485 2-wire
Communication speed (B_R)	9600 [Baud]
Communication protocol	MODBUS RTU
Maximum String Readers per one RS485 line	30

THE IMM GATEWAY



Gathers telemetry from in-field devices and pushes it to the IMM Web Portal

RS485 communication channels	5
Supported protocols (RS485)	MODBUS et al.
S0 Inputs (S0)	2
Analog Sensor Inputs (NSENSOR)	up to 4
Maximum attached String Readers (NSTR)	up to 150 [pcs.]
Maximum inverters (NINV)	up to 30 [pcs.]
Maximum RS485 cable length	1000 [m]
Dimension (LxWxH)	142 x 90 x 30 [mm]
Weight	0,20 [kg]
Installation	DIN-rail
Protective insulation	2
Protection class	IP 20
Operating temperature	-25 to +60 [°C]

INTERNET CONNECTION

Interface	Ethernet RJ45
IP Address	automatic, over DHCP
Power supply requirements	24 (DC) [V] 1.5 (<40 String Readers) [A] 2.5 (Otherwise) [A]
Gateway power consumption	<5 [W]
Consumption per attached String Reader	<1 [W]

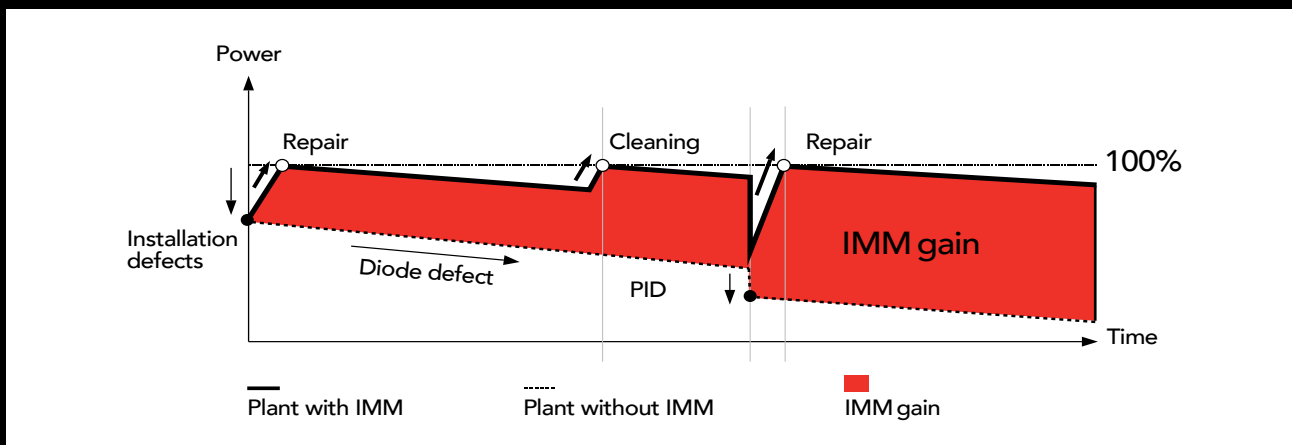
AEG

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THE IMM GAIN



FOR OWNERS, INVESTORS AND POWER SUPPLY COMPANIES

Higher yield due to fast and total recognition of faults and necessary maintenance

Certainty about a good plant condition and a rewarding investment

All performance data is accessible at any time, also via mobile phone

Error messages are easy to understand even for non technicians

Advanced O&M thanks to artificial intelligence; asset management for several plants

FOR SOLAR POWER SYSTEM INSTALLERS

Simple recognition of optimization potentials

Fast and easy detection of faults allows perfect service

Time-saving management of plant maintenance

Fast clarification of warranty and guarantee claims

FOR JUNCTION BOX AND INVERTER MANUFACTURERS

Unique selling point
new possibilities for intelligent PV systems

Easy Integration

Achieved performance automatically prepared and visualized