We are:

**Excellence, innovation, commitment**

MFS IDI is a MELFOSUR subsidiary company, which was born to give the technological and professional tools to get its clients to become more competitive.

MFS IDI’s mission is to develop especialized projects in the R&D renewables sector, achieving the creation of products with the best value.
Over 25 years of history

We have proven experience of over 25 years in the electricity sector.
We are a global provider of efficient and sustainable energy solutions.
The presence of Melfosur can be found throughout the entire energy cycle, from concept design to market introduction.
Melfosur has a strong international presence and vocation
Keys to success
Integration of activities for a full service

Melfosur performs an important activity in the green energies sector.

We have installed more than 20MW in this sector.

We are pioneers in project implementation, promotion and installation of solar photovoltaic and wind power.

We have set renewable energy for sustainable development, using the latest technology for maximum efficiency and productivity.
We have developed and integrated in the same machine the brains and heart of an installation, for commercial, industrial or domestic purposes:

- Maximum efficiency to transform electric power in heating and cooling.

- Smart management of multiple energy sources: conventional and renewable.

- Energy storage, load and unload of electric vehicles.

- Automatic optimization of consumption: Set up, control, remote management.
Ecogeosolar:

Technological partners

- ecoFOREST
- Copeland
- OMRON
- ABB
- Schneider Electric
- Panasonic
COMPETITIVE ADVANTAGES

HIGHEST EFFICIENCY COEFFICIENT (COP/EER) FOR 1-PHASE HEAT PUMPS

COP = 4.9  EER = 6.9

AIT HOMOLOGATION (Austrian Institute of Technology)

CC/CA CONVERSION EFFICIENCY, PEAK 98.3%, AVERAGE 97.7%

EMC certificate (Intertek)

REGULATORY COMPLIANCE INCLUDING GRID INTERCONNECTION AND ELECTRIC SYSTEM LOAD AND UNLOAD:

FULFILLING THE STANDARDS IN 18 COUNTRIES:
COMPETITIVE ADVANTAGES

INCLUDING COPELAND INVERTER TECHNOLOGY.

Inverter technology. Specifically developed for the Scroll compressor

High efficiencies unreachable with traditional heat pumps

Compact and economic installations:

Lower electric consumption
Higher durability and reliability

ELECTRONIC EXPANSION VALVE

Allows an accurate control of the refrigerant flow and a better use of the evaporator to reach higher efficiencies.
THERMAL PRODUCTION ADAPTED TO THE DEMAND

Variable speed compressor management

PREDICTIVE-ADAPTATIVE MANAGEMENT SYSTEM. MAXIMUM CONSUMPTION OPTIMIZATION

Internal/external processing for more than 200 system variables
Dynamic working setpoints
VPN communication predictive management, external server calculation

BATTERY POWER STORAGE

Modular Power System Load / Unload and Storage.
High accuracy unload management under monitoring of maximum power point (MPPT) of the photovoltaic system,
Unload efficiency > 97%.
COMPETITIVE ADVANTAGES

ELECTRIC VEHICLE BATTERY LOADING HIGH POWER MODULE
Load Manager includes interactive grid management and renewable resource.

SMART GRID COMMUNICATION MANAGEMENT MODULE. ENERGY EXCESS MANAGER.
The device can interface mode Distributed Generation System with other computers on network configuration and injection under one control center.
DESIGNED TO LAST

• Risk evaluation to save installation problems.
• Validation of the operating conditions even beyond ranges
• Identifying improvement points

Diverse tests:
1. THB: Temperature humidity bias
2. Salt-Fog testing
3. HALT: Highly accelerated life test
4. MEOST: Multiple Environmental over stress testing
5. Custom reliability testing
Inverter technology, variable speed scroll compressor
Maximum energy savings:
Liquid cooling system for the inverter
3 Cooling modules, cooling, heating, reverse cycle
microPC control system
User friendly Interface
THERMAL TECHNOLOGY SYSTEM

- Copeland compressor and inverter
- Electronic expansion valve in every model
- Variable speed, high efficiency, A class circulation pumps for the brine and heating circuits.
- Temperature and pressure sensors in water and refrigerant circuits
- R410A, the best refrigerant for heat pumps
- Included expansion vessels, security and drain valves.
THERMAL SYSTEM COMPONENTS

- Scroll compressors and Inverter, COPELAND
- Electronic expansion valve, CAREL
- Circulation pumps, WILO
- microPC, CAREL, ONROM control
- Exchangers, ALFA LAVAL
- Auxiliary components, DANFOSS
- Stainless steel DHW tank and coil
INVERTER TECHNOLOGY

► New Copeland inverter technology

○ Rpm variation, 1800 - 7000
○ 2 diff. compressors-inverter, 3 - 12 kW y 5 - 22 kW
○ 1-phase and 3-phase power supply
○ ModBUS, inverter-compressor, inverter-control
○ Power correction factor(\(\cos \phi \approx 1\))
○ No current peaks
THERMAL SYSTEM: INSTRUMENTATION - MANAGEMENT

➡️ Instrumentation

● Temperature sensors
  - Outlet/inlet heating, brine and aero-thermal
  - Drain, discharge, inverter, oil

● Pressure sensors
  - Compressor drain and discharge
  - Heating and brine circuits

● Inverter electric consumption

● Compressor torque, max torque
THERMAL SYSTEM: INTEGRATION

► Design, “all in one concept”

- Includes brine and heating circulation pumps
- Includes expansion vessels
- Includes security valves
- Includes drain valves
- Includes flexible connection hoses
POWER

Heating power 3-12, 30/35 °C
POWER

Heating power 5-22, 30/35 °C

Potencia calorífica (kW)

rpm
ecoGEO – COP

COP 5-22, 30/35 ºC
INSTALLATIONS

► Hybrid technology
  ● Installation simplicity

► All in one concept, “plug and play”
  ● Fast installation and commissioning

► Simpler and more economic installations
## Configuration of the Grid Connection Operation According to the Standard of Different Countries

**Australia**

<table>
<thead>
<tr>
<th>Categoría</th>
<th>Elemento</th>
<th>Configuración</th>
<th>Tiempo de desconexión y reconexión (s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltaje rápido (VAC)</td>
<td>Volt. AC alto desconectado</td>
<td>270</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Volt. AC alto conectado</td>
<td>265</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>Volt. AC bajo desconectado</td>
<td>200</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Volt. AC bajo conectado</td>
<td>205</td>
<td>N/A</td>
</tr>
<tr>
<td>Voltaje lento (VAC)</td>
<td>Volt. AC alto desconectado lento</td>
<td>264,0</td>
<td>600</td>
</tr>
<tr>
<td></td>
<td>Volt. AC alto conectado lento</td>
<td>262,0</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>Volt. AC bajo desconectado lento</td>
<td>200</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Volt. AC bajo conectado lento</td>
<td>205</td>
<td>N/A</td>
</tr>
<tr>
<td>Frecuencia rápida (Hz)</td>
<td>Frec. AC alta desconectada</td>
<td>55</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Frec. AC alta conectada</td>
<td>54,95</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>Frec. baja desconectada</td>
<td>45</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Frec. baja conectada</td>
<td>45,05</td>
<td>N/A</td>
</tr>
<tr>
<td>Tiempo de reconexión (s)</td>
<td></td>
<td>20</td>
<td>N/A</td>
</tr>
<tr>
<td>Parameter</td>
<td>Value</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-----------------------------------------------</td>
<td>------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pot. nominal instant</td>
<td>[ Actual ]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frecuencia inicial</td>
<td>[ 50,30 ] Hz</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frecuencia final &quot;1&quot;</td>
<td>[ ------ ] Hz</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frec. recuperación &quot;2&quot;</td>
<td>[ ------ ] Hz</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gradiente &quot;3&quot;</td>
<td>[ 2,4 ] %</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tiempo recuperación &quot;4&quot;</td>
<td>[ 300,00 ] s</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Modo</td>
<td>[ ACTIVADO ] Hz</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

![Diagram](https://via.placeholder.com/500)
### Low Voltage Protection Period

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Banda inactiva, $V_h$</td>
<td>+10 V</td>
</tr>
<tr>
<td>Banda inactiva, $V_l$</td>
<td>-15 V</td>
</tr>
<tr>
<td>Factor $K$</td>
<td>2,0 %</td>
</tr>
<tr>
<td>$V_{caída}$</td>
<td>0 V</td>
</tr>
<tr>
<td>$t_1$</td>
<td>600 s</td>
</tr>
<tr>
<td>$U_1$</td>
<td>20 %</td>
</tr>
<tr>
<td>$t_2$</td>
<td>1,5 %</td>
</tr>
</tbody>
</table>

---

**Diagram:**

- **Factor $K$:** Position on the x-axis indicates the factor.
- **$ΔU/U_n$:** The graph shows the ratio $ΔU/U_n$ with $U_n$ being the nominal voltage.
- **$U_{red}/U_{nom}$:** The graph illustrates the ratio of reduced voltage to nominal voltage, with $U_{nom}$ being the nominal voltage.
- **$V_{caída}$:** The diagram indicates the voltage drop at different points.
- **Momento del fallo:** This denotes the moment of the failure in the system.
Adaptive management

MODULE INTELLIGENT ENERGY EFFICIENCY

CONSUMPTION ESTIMATION CURVES\(C_n\) (iniciales)

PREDICTIVE MANAGEMENT

DYNAMIC SETPOINT VARIATION

GENERATION CURVES ESTIMATION

COMMUNICATION MANAGEMENT MODULE

DISTRIBUTED GENERATION MANAGEMENT MODULE

AVAILABLE SAVINGS

SMART GREEN COMMUNITY
IEE module: Consumption estimation
IEE: Consumption estimation
IEE module: Consumption estimation
IEE module: Consumption estimation
IEE module: Predictive management
nvar = 4;
gaoptions = gaoptimset('Generations',15,'Display','iter');
startTime = tic;
ga(@expensive_objfun,nvar,[],[],[],[],[],[],[],[]);  
time_ga_sequential = toc(startTime);
fprintf('Serial GA optimization takes %g seconds.
',time_ga_sequential);

<table>
<thead>
<tr>
<th>Generation</th>
<th>Best f-count</th>
<th>Best f(x)</th>
<th>Mean f(x)</th>
<th>Stall Generations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>40</td>
<td>1.469</td>
<td>23.18</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>60</td>
<td>1.236</td>
<td>20.34</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>80</td>
<td>0.655</td>
<td>7.149</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>100</td>
<td>-0.9582</td>
<td>5.889</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>120</td>
<td>-1.876</td>
<td>4.473</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>140</td>
<td>-1.876</td>
<td>2.757</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>160</td>
<td>-1.958</td>
<td>0.2561</td>
<td>0</td>
</tr>
<tr>
<td>8</td>
<td>180</td>
<td>-2.387</td>
<td>2.363</td>
<td>0</td>
</tr>
<tr>
<td>9</td>
<td>200</td>
<td>-5.238</td>
<td>3.562</td>
<td>0</td>
</tr>
<tr>
<td>10</td>
<td>220</td>
<td>-23.18</td>
<td>2.033</td>
<td>0</td>
</tr>
<tr>
<td>11</td>
<td>240</td>
<td>-44.76</td>
<td>-1.239</td>
<td>0</td>
</tr>
<tr>
<td>12</td>
<td>260</td>
<td>-44.76</td>
<td>-12.72</td>
<td>1</td>
</tr>
<tr>
<td>13</td>
<td>280</td>
<td>-44.76</td>
<td>-23.8</td>
<td>2</td>
</tr>
<tr>
<td>14</td>
<td>300</td>
<td>-64.49</td>
<td>-34.12</td>
<td>0</td>
</tr>
<tr>
<td>15</td>
<td>320</td>
<td>-64.49</td>
<td>-42.11</td>
<td>1</td>
</tr>
</tbody>
</table>

Optimization terminated: maximum number of generations exceeded.
Serial GA optimization takes 40.2414 seconds.
Green Community Module: Communication management, next generation VPN Industrial server
Green Community Module: Communication management, next generation VPN Industrial server

![Service Overview Diagram]

- **VPN Clients**
  - Windows PC's, iPhones/iPads
  - Service: VPN 10, No of VPNs: 5 VPN Clients*
  - Service: VPN 25, No of VPNs: 10 VPN Clients*
  - Service: VPN 50, No of VPNs: 15 VPN Clients*
  - Service: VPN 100, No of VPNs: 20 VPN Clients*
  - *Number of VPN clients that can be connected simultaneously to the server

- **Internet**
  - SSL/IPSec VPN Tunnels

- **Remote Networks**
  - Remote Routers
  - Service: VPN 10, No of Routers: Up to 10 Routers
  - Service: VPN 25, No of Routers: Up to 25 Routers
  - Service: VPN 50, No of Routers: Up to 50 Routers
  - Service: VPN 100, No of Routers: Up to 100 Routers
Green Community Module: Energy exchange management, distributed generation
Green Community mode: Distributed generation

\[ x_2 \leq 31 \quad \text{Min} \quad c^T x \quad x \in F_3 \]

\[
\begin{bmatrix}
0 & 0 & 1 & 4/10 & -1 & -20 & 0
-1 & 0 & 0 & 1/2 & 0 & -1 & 0
0 & 0 & 0 & -1/50 & 3/2 & 8/3 & 0
-1 & 0 & 0 & -1/50 & 1 & 1 & 0
0 & 0 & 0 & -1/50 & 1/2 & 8/3 & 0
1 & 0 & 0 & -1/50 & 1 & 1 & 0
0 & 0 & 0 & 0 & 0 & 0 & 0
\end{bmatrix}
\]

\[ z_3^* = -61, \quad z_0 = -61 \]

\[(x_1, x_2, x_3, x_4, x_5, x_6, x_7, x_8) = (26, \frac{91}{3}, 4, 0, 0, 11, 4, 0, 2)\]

\[ [z_2^*] = \begin{bmatrix} -181/3 \end{bmatrix} = -64 > z_0 = -61 \quad \text{Nudo 2} \]

\[(x_1, x_2, x_3, x_4, x_5, x_6, x_7, x_8) = (26, 32, 3, 7, 5, 0, 4, 0, 0)\]

\[ z_4^* = -61 = z_0 = -61 \]

Nudo 4

Soluciones:

\[(x_1, x_2, x_3, x_4, x_5, x_6, x_7, x_8) = (26, 32, 3, 7, 5, 0, 4) \quad \text{Nudo 4} \]
\[(x_1, x_2, x_3, x_4, x_5, x_6, x_7, x_8) = (27, 31, 3, 10, 0, 1, 3) \quad \text{Nudo 2} \]
ECOGEOSOLAR INSTALLATION

Advantages of the installations

- High economical savings

<table>
<thead>
<tr>
<th>PONTEVEDRA</th>
<th>150 m²</th>
<th>4 people</th>
<th>SOUTH</th>
<th>Well isolated housing</th>
<th>20/21 °C</th>
<th>45</th>
</tr>
</thead>
</table>

10,50 kW

Energy cost according to the system (€/year)

Electric power: €1590/year
Gas boiler: €1502/year
Propane: €1310/year
Pellet boiler: €918/year
Natural gas boiler: €864/year
ASHP: €530/year
GSHP: €398/year
ecoGEO: €353/year

78% energy savings
CONNECTION TYPES: OFF GRID

SOLAR

GENERATOR

BATTERIES

GREEN COMMUNITY

AC

DC
CONNECTION TYPES: BACKUP

SUSTAINABLE SOLUTIONS

GENERATOR → BATTERIES → GRID → DOMESTIC CONSUMPTION

AC
DC
CONNECTION TYPES: ON GRID

- SOLAR
- BATTERIES
- GRID
- INDUSTRIAL CONSUMPTION

- AC
- DC
CONNECTION TYPES: INTERACTIVE NETWORK MODE

Grid support

Selling to the grid
- Selling DC excess to the grid.

Grid support (LBX)
- Allows to lower the grid consumption by providing renewable energy.

Reduction of the maximum consumption
- Limits the grid consumption by providing energy from the battery.

Time regulation
- Loads the battery during the low pricing period and expends such energy during daytime.
CONNECTION TYPES: HYBRID MODE
INTERACTIVE GRID+ HVAC
EcoGeoSolar Hybrid System

Domestic Application:
1 Unit: modulation 5 to 22 kW
12 Units: Parallel connection management – modulation 5 to 264 kW

Industrial applications:
3-Phase modules: N units parallel connection management.
### SOLAR HYBRID SYSTEM Data Sheet: 10kW Power Electronics Module

<table>
<thead>
<tr>
<th>Component</th>
<th>ecoGEO-SOLAR-1</th>
<th>ecoGEO-SOLAR-2</th>
<th>ecoGEO-SOLAR-3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cooling pump module</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power Electronics</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Front Panel</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Connecting solar modules</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electrical grid connection</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electrical protection</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HVAC drive</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HVAC return</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dissipation impulsion circuit</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dissipation return circuit</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. DHW drive coil</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. DHW return coil</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Electrical Specifications (AC)

<table>
<thead>
<tr>
<th>Specification</th>
<th>ecoGEO-SOLAR-1</th>
<th>ecoGEO-SOLAR-2</th>
<th>ecoGEO-SOLAR-3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal voltage (V)</td>
<td>110 V</td>
<td>220 V</td>
<td>110 V</td>
</tr>
<tr>
<td>Operating voltage range</td>
<td>90 - 130 V</td>
<td>180 - 260 V</td>
<td>90 - 130 V</td>
</tr>
<tr>
<td>Frequency range</td>
<td>50 Hz</td>
<td>60 Hz</td>
<td>50 Hz</td>
</tr>
<tr>
<td>Input power (kW)</td>
<td>10</td>
<td>20</td>
<td>10</td>
</tr>
<tr>
<td>Output power (kW)</td>
<td>9</td>
<td>19</td>
<td>9</td>
</tr>
<tr>
<td>Inverter efficiency</td>
<td>97%</td>
<td>97%</td>
<td>97%</td>
</tr>
</tbody>
</table>

### General Specifications

- **Output**: 10kW
- **Inverter Efficiency**: 97%
- **Insulation Class**: F
- **Voltage Regulation**: ±0.5%
- **Power Factor**: 0.99
- **Environmental Conditions**: -20°C to 45°C
- **Humidity**: 90% non-condensing
- **Safety Features**: 2G circuit breaker, overload protection, current limiting
- **Battery Type**: Lithium-ion, 3-year warranty
- **Battery Capacity**: 10kWh

### Battery Features and Options

- **Maximum Battery Voltage**: 150 V DC
- **Capacity**: 10kWh
- **Discharge Depth**: 70%
- **Charge Rate**: 80%
- **Cycle Life**: 5,000 cycles
- **Battery Management System (BMS)**: Integrated

### Regulatory Approval

- **AC Marking**: UL / cUL, CE, TUV, SAA
- **Certification**: CE, UL, Cpsc
- **Approval Body**: UL, cUL, CE, TUV, SAA
- **Enforcement**: CE, UL, Cpsc, Czech, Germany, Canada

---

1. According to EN 12101-1, 12101-3 (including alternation pumps, invertor with single pump group)
2. According to EN 12101-4 (including circulation pumps, invertor with single pump group)
3. According to EN 12101-5 (including circulation pumps, invertor with single pump group)
4. According to EN 12101-6 (including circulation pumps, invertor with single pump group)
5. According to EN 12101-7 (including circulation pumps, invertor with single pump group)
6. According to EN 12101-8 (including circulation pumps, invertor with single pump group)
### SOLAR HYBRID SYSTEM EcoGeo

#### DATA SHEET: 6 kW Power Electronics Module

<table>
<thead>
<tr>
<th>EcoGeo-SOLAR</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Application</strong></td>
<td>Heating &amp; DHW</td>
<td>Addressing</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Refrigerant</strong></td>
<td>R410A</td>
<td>R410A</td>
<td>R410A</td>
<td>R410A</td>
<td>R410A</td>
<td>R410A</td>
<td>R410A</td>
<td>R410A</td>
<td>R410A</td>
<td>R410A</td>
<td>R410A</td>
<td>R410A</td>
</tr>
<tr>
<td><strong>Components</strong></td>
<td>Compressor</td>
<td>Copeland Scroll inverter</td>
<td>Copeland Scroll inverter</td>
<td>Copeland Scroll inverter</td>
<td>Copeland Scroll inverter</td>
<td>Copeland Scroll inverter</td>
<td>Copeland Scroll inverter</td>
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<td>Copeland Scroll inverter</td>
<td>Copeland Scroll inverter</td>
<td>Copeland Scroll inverter</td>
<td>Copeland Scroll inverter</td>
</tr>
<tr>
<td><strong>Electrical Supply</strong></td>
<td>Overvoltage protection</td>
<td>32</td>
<td>40</td>
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<td><strong>Cooling Circuit</strong></td>
<td>Compressor output kW</td>
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<td>Power capacity kW</td>
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<td>Power rating kW</td>
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<td>Maximum Power Output kW</td>
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<td><strong>Discharge circuit</strong></td>
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<td>Water temperature °C</td>
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<td><strong>DHW</strong></td>
<td>Capacity</td>
<td>L</td>
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<td><strong>Non-slippery</strong></td>
<td>Noise emission dB(A)</td>
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<td>Dimensions (mm)</td>
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<td>1500 x 585 x 300</td>
<td>1500 x 585 x 300</td>
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<td>1500 x 585 x 300</td>
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<tr>
<td>Weight (kg)</td>
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<td>270</td>
<td>270</td>
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</tbody>
</table>

1. According to EN 14511:2001, 5.2.4-5.2.5 (c) (including circulation pumps, water heater with single phase power)
2. According to EN 14511:2001, 5.2.4-5.2.5 (c) (including circulation pumps, water heater with single phase power)
3. According to EN 14511:2001, 5.2.4-5.2.5 (c) (including circulation pumps, water heater with single phase power)
4. According to EN 14511:2001, 5.2.4-5.2.5 (c) (including circulation pumps, water heater with single phase power)
5. According to EN 14511:2001, 5.2.4-5.2.5 (c) (including circulation pumps, water heater with single phase power)
6. According to EN 14511:2001, 5.2.4-5.2.5 (c) (including circulation pumps, water heater with single phase power)
7. According to EN 14511:2001, 5.2.4-5.2.5 (c) (including circulation pumps, water heater with single phase power)
8. According to EN 14511:2001, 5.2.4-5.2.5 (c) (including circulation pumps, water heater with single phase power)
9. According to EN 14511:2001, 5.2.4-5.2.5 (c) (including circulation pumps, water heater with single phase power)
10. According to EN 14511:2001, 5.2.4-5.2.5 (c) (including circulation pumps, water heater with single phase power)
11. According to EN 14511:2001, 5.2.4-5.2.5 (c) (including circulation pumps, water heater with single phase power)
12. According to EN 14511:2001, 5.2.4-5.2.5 (c) (including circulation pumps, water heater with single phase power)
1-PHASE UL-USA: EFFICIENCY CURVES

Rendimiento (%)

Corriente de carga (amperios)
1-PHASE UL-USA: OVERLOAD CAPACITY

Capacidad de sobrecarga de CA de ECOGEOSOLAR 6048

Capacidad de sobrecarga de CA de ECOGEOSOLAR 4548

Disminución de potencia

Rendimiento (%)
1-PHASE EU EFFICIENCY CURVES
1-PHASE EU: OVERLOAD CAPACITY

Power decrease

![Temperature vs Power Decrease Graph](image-url)
3-PHASE EFFICIENCY CURVES

10kW efficiency curves

10kVA efficiency curves
SUSTAINABLE SOLUTIONS

Confirmation of Conformity

Nr. : CN 28300280.001

TÜV Rheinland Ibérica
Inspection, Certification and Testing, S.A.

confirm that the following product:

**Type:**
- ecoGEO SOLAR M10-12B
- ecoGEO SOLAR M10-22B
- ecoGEO SOLAR M15-22B
- ecoGEO SOLAR M30-22B
- ecoGEO SOLAR M30-12B
- ecoGEO SOLAR M35-12B
- ecoGEO SOLAR M35-22B
- ecoGEO SOLAR M35-22B

**Model:**

manufactured by:
MFS IDI, S.L.
Avda. Riu Tordera, 19
E 18110 Las Gaviotas (Girona) SPAIN

have been evaluated on documentary basis according to the requirements of following directives:

- Low Voltage Directive 2006/95/EC
- Machinery Directive 2006/42/EC

The above mentioned products complies with the essential safety requirements specified in these directives.

List of Standards

**Low Voltage Directive 2006/95/EC**

- Electronic equipment for use in power installations: EN 50178:1997
- Safety of household and similar electrical appliances: EN 60335-1
- EN 60335-2-29:2004
- EN 60335-2-34:2013
- Safety and environmental requirements: EN 12603:2008

**EMC Directive 2004/108/EC**

- Conducted / radiated: EN 61900-6-4:2007 CISPR11
- EN 61131-2:2007
- EN 61900-6-4
- Emissions: EN 61900-6-3:2007 (Residential)
- EN 55014-1:2006
- Immunity: EN 61900-6-2:2006 (Industrial)
- EN 55014-1:2006
- Limits for voltage: EN 61000-3-3:2008
- Phasor systems power conditions: IEC 61853-1999
- General: EN 61000-6-1:2001
- ESD: EN 61000-6-2:2005
- IEC 61000-4-2
- EN 61131-2:2007
- RF EM Field: EN 61000-6-2:2005
- IEC 61000-4-3
- EN 61131-2:2007
- Fast transient: EN 61000-6-2:2005
- IEC 61000-4-4
- EN 61131-2:2007
- Conducted disturbances: EN 61000-6-2:2005
- IEC 61000-4-6
- EN 61131-2:2007

The Confirmation enables to mark the product with the standard designation, but does not enable to use marks related with TÜV Rheinland Group on the product or packaging.
### SUSTAINABLE SOLUTIONS

**Surge immunity**
- EN 61000-4-2:2005
- IEC 61000-4-3
- EN 61131-2:2007

**Voltage dips and interruptions**
- EN 61000-4-2:2005
- IEC 61000-4-1
- EN 61131-2:2007
- IEC 61000-4-6
- IEC 61000-4-2009
- IEC 61000-4-11:2004

**Testing and measurement techniques**
- IEC 61000-4-2:2009
- IEC 61000-4-11:2004

**Generic standards**

**Machinery Directive 2006/42/CE:**
- Safety and environmental requirements: EN 12962:2005
- Particular requirements for electrical heat pumps: EN 60335-2-40:2003

**Grid Interconnection:**
- VDE0126-1-1
- VDE V 0124-100
- VDE-AR-N 4155:2011-06
- RDN
- NE 1699
- CEI 0-21 V2.2010
- CEI 0-15 V1.2013
- G962 */
- UTE C15-712-1
- AS4777/5477
- IEC 62116
- IEC 61727

*Only for equipment 15-20 kV onward

End of list
INFORMATION SCREENS

![Image of information screens showing power, voltage, current, energy output, storage, and usage status.]
SETTING SCREENS

INVERTER SETTINGS

CHARGER SETTINGS

GRID SUPPORT

AC SETTINGS

ECOGEO INVERTER SETTINGS

REACTIVE POWER CONTROL

2: cos (p) As Function of P

Upper Limit cos (p) CAPACITIVE: 0.60 to 1.00 Enter: 80 to 100
Lower Power % Reactive Power Mode:
Lower Limit cos (p) CAPACITIVE: 0.80 to 1.00 Enter: 80 to 100
Upper Power %

ECOGEO INVERTER SETTINGS

REACTIVE POWER CONTROL

4: kVAR As Function U

Upper Limit kVAR (U) % Increment 1% | Range: -53 to 53% | Default 43%
Lower Limit kVAR (U) % Increment 1% | Range: -53 to 53% | Default 43%
kVAR (U) Vmin Unit: 0.1 | Range: 100~260 V | Default: 184 V
kVAR (U) Vmax Unit: 0.1 | Range: 100~260 V | Default: 253 V
SETTING SCREENS

ECOGEF INVERTER SETTINGS

**ACTIVE POWER CONTROL**

- Active Power Limit: kW
- Reactive Power Reference: kVAR, kVAR(a) > 0: Leading kVAR (capacitive), kVAR(a) < 0: Lagging kVAR (inductive)

**REACTIVE POWER CONTROL**

- Reactive Power Mode: 0: Disable, 1: Fixed kVAR (a), 2: kVAR(a) = f. as a Function of P, 3: Fixed kVAR, 4: kVAR(a) = f. as a Function of U

---

**CHARGER SETTING**

- **PARAMETER**
  - Charge Cycle: 1: Cool, 2: Warm, 3: Hot
  - Battery Type: 1: Flooded, 2: Low, 3: AGM
  - Battery Bank Capacity: Ah
  - Charge Rate: %
  - Depth of Discharge: %
  - Charge Block Start:
  - Charge Block Stop:

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**EcoForest**

SUSTAINABLE SOLUTIONS
EcogeoSolar Hybrid System
The ultimate solution

- Easy installation
- Grid interaction modes
- High configuration flexibility
- Storage system included
- Highest market efficiency 98,3%
- Highest HVAC market efficiency system COP 4,9
PROJECTS: SMART GRID CITY
MF02 SMART GRID SYSTEM
SMART GRID CITY BARCELONA
A member of the MELFOSUR GROUP

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