AI-enabled Preventive Grid Analytics

Fault Detection & Location

Preventive Analysis

Improved Grid Reliability and Safety
IWOS: Line Sensor + Concentrator + AI Analytics Platform

**System Components**

**Line Sensor**
- Compatible with 50Hz/60Hz grids
- High-precision current measurement: 0-630A ±0.5%
- High sampling rate of oscillography waveform: 12.8KHz (256 samples/cycle)
- Zero-sequence current synthesis enabled by 20μs precision sync
- Power optimization operation
  - Full-function mode: all functions including waveform recording enabled; powered by line and supercapacitor
  - Low-power mode: waveform recording disabled; powered by line and battery
- Power harvesting: 1A to support full-function mode; supercapacitor backs for 12h
- IP67, water proof
- Light weight: <1.5kg, live installation and removal

**Concentrator**
- WAN: LTE/AMI/LoRa
- Field Area Network: RF
- High-precision (1μs) GPS for location and time synchronization
- Fault detection based on zero-sequence current synthesis
- Main and backup power: solar, maintenance-free capacitor
- IP55 protection
- Remote upgrade & maintenance

**AI Analytics Platform**
- Sensor and concentrator management
- GIS-based real-time monitoring of line status and events
- Deep learning analytic system
- Oscillography waveform classification powered by AI algorithms
- Accurate fault location and SMS alarms
- Preventive analysis and early warning
- Flow Direction & Load Analysis
  - Load trend & statistics
  - Power quality analysis
  - Fault statistics

**World’s #1 Deployment**

<table>
<thead>
<tr>
<th>Line Sensors Deployed</th>
<th>Power Lines Covered</th>
<th>Power Line Events &amp; Waveform Data</th>
<th>Line Faults Detected</th>
</tr>
</thead>
<tbody>
<tr>
<td>75,000+</td>
<td>7,000+</td>
<td>25 Million+</td>
<td>32,000+</td>
</tr>
</tbody>
</table>

**World’s Most Deployed**

- 32,000+ Line Faults Detected
- 7,000+ Power Lines Covered
- 25 Million+ Power Line Events & Waveform Data

**AI Analytic System**

- Oscillography waveform classification powered by AI algorithms
- Accurate fault location and SMS alarms
- Preventive analysis and early warning
- Flow Direction & Load Analysis
  - Load trend & statistics
  - Power quality analysis
  - Fault statistics

**Line Sensor + Concentrator + AI Analytics Platform**
Model Nomenclature

The IWOS products (Line Sensor, Concentrator) are prefixed with JYL-IH, consisting of product type code ‘JYL’ and manufacturer code ‘IH’. The IWOS line sensor and concentrator are differed by inter-fixes. Line sensor and concentrator models are specified by suffixes.

**IWOS Line Sensor**

<table>
<thead>
<tr>
<th>Model Prefix</th>
<th>Power Line/Short-range Frequency</th>
<th>Version Code*</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase A</td>
<td>C: 50Hz/470MHz (China)</td>
<td>A: AI</td>
<td></td>
</tr>
<tr>
<td>Phase B</td>
<td>U: 60Hz/915MHz (USA)</td>
<td>L: LT</td>
<td></td>
</tr>
<tr>
<td>Phase C</td>
<td>M: 60Hz/866MHz (Middle East)</td>
<td>E: EF</td>
<td></td>
</tr>
</tbody>
</table>

Example: JYL-IH-HX-LNCE represents IWOS concentrator, line-mounted, support 4G, without encryption chip, applicable to China’s 50Hz, 10KV power lines, short-range communication frequency is 470MHz.

* IWOS line sensor version codes:
  - AI - new look higher-configuration version
  - LT - new look lower-configuration version
  - EF – old version

**IWOS Concentrator - Pole-mounted**

<table>
<thead>
<tr>
<th>Model Prefix</th>
<th>Network Type</th>
<th>Battery</th>
<th>Solar Panel</th>
<th>Encryption Chip</th>
<th>Power Line/Short-range Frequency</th>
<th>Match w/ IWOS Line Sensor</th>
</tr>
</thead>
<tbody>
<tr>
<td>JYL-IH-HD</td>
<td>G - GPRS</td>
<td>A - 7.2Ah Lead-acid</td>
<td>2-20W</td>
<td>N - none</td>
<td>C - 50Hz/470MHz (China) U - 60Hz/915MHz (USA) M - 60Hz/866MHz (Middle East)</td>
<td>A - A/LT E - EF</td>
</tr>
<tr>
<td></td>
<td>L - 4G</td>
<td>B - 12Ah Lead-acid</td>
<td>3-30W</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>C - 40Ah Li-phosphate</td>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>D - 40Ah Gel battery</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>E - 12Ah Li-phosphate</td>
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</tr>
</tbody>
</table>

Example: JYL-IH-HD-LA2NCE represents IWOS concentrator, pole-mounted, support 4G, 7.2Ah battery, 20W solar panel, without encryption chip, applicable to China’s 50Hz, 10KV power lines, short-range communication frequency is 470MHz, matches with EF version IWOS line sensor.

**IWOS Concentrator – Line-mounted**

<table>
<thead>
<tr>
<th>Model Prefix</th>
<th>Network Type</th>
<th>Encryption Chip</th>
<th>Power Line/Short-range Frequency</th>
<th>Match w/ IWOS Line Sensor</th>
</tr>
</thead>
<tbody>
<tr>
<td>JYL-IH-HX</td>
<td>G - GPRS</td>
<td>N - none</td>
<td>C - 50Hz/470MHz (China) U - 60Hz/915MHz (USA) M - 60Hz/866MHz (Middle East)</td>
<td>A - A/LT E - EF</td>
</tr>
<tr>
<td></td>
<td>L - 4G</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Example: JYL-IH-HX-LNCE represents IWOS concentrator, line-mounted, support 4G, without encryption chip, applicable to China’s 50Hz, 10KV power lines, short-range communication frequency is 470MHz, matches with EF version IWOS line sensor.