VisiVolt™
Passive Voltage Indicator
OEM Presentation
VisiVolt™ Passive Voltage Indicator
Increased safety

- Electric accidents belong to the most frequent and serious ones
- Medium voltage distribution systems are the most prone to accidents
- Typical reasons:
  - false belief in voltage absence originating from lack of communication, mistake etc.
  - not following the safety procedures

Picture courtesy of www.line-man.com
VisiVolt™ Passive Voltage Indicator
VisiVolt™ - Introduction

Previously used neon indicators

VisiVolt™ installation
VisiVolt™ Passive Voltage Indicator
VisiVolt™ - Introduction

- **Product name:**
  - PL: Pasywny Wskaźnik Napięcia
  - EN: Passive Voltage Indicator
  - RU: Пассивный Индикатор Напряжения
  - FR: Indicateur Passif de Tension
  - DE: Passiver Spannungsanzeiger
  - ES: Indicador Pasivo de Tensión

- Previously known as (prototype and pilot products):
  - PVI
  - PassVI

- **VisiVolt™ is an indicator of voltage presence**
  - For permanent installation
  - Current-bar mounted type (belongs to the primary circuits)
  - To be used on not screened (not ground-shielded) conductors
  - Passive
  - Outdoor and indoor application
  - For systems of nominal voltages from 3kV/6kV to 36kV
VisiVolt™ Passive Voltage Indicator
IEC standards

- Hot stick mounted indicators for line testing
  - IEC 61243-1
    Live working - Voltage detectors –
    Part 1: Capacitive type to be used for voltages exceeding 1 kV a.c.
  - IEC 61243-2
    Live working - Voltage detectors –
    Part 2: Resistive type to be used for voltages of 1 kV to 36 kV a.c.

- Low voltage indicators
  - IEC 61243-3
    Live working - Voltage detectors –
    Part 3: Two-pole low-voltage type

- Indicators installed permanently (e.g. in switchgear)
  - IEC 61243-5
    Live working - Voltage detectors –
    Part 5: Voltage detecting systems (VDS)
  - IEC 61958
    High-voltage prefabricated switchgear and controlgear assemblies –
    Voltage presence indicating systems (VPIS)

  - Threshold voltages:
    indication at >45% of nominal voltage;
    no indication at <10% of nominal voltage
VisiVolt™ Passive Voltage Indicator

Type tests

- Test of voltage thresholds
- Dielectric tests
- Short-time withstand current and peak withstand current tests
- Moisture ingress test
- Sun radiation test
- Low- and high-temperature functionality tests
VisiVolt™ Passive Voltage Indicator
Global intellectual property protection
VisiVolt™ Passive Voltage Indicator
Specification application and threshold voltages

<table>
<thead>
<tr>
<th>VisiVolt™ type</th>
<th>VV-A</th>
<th>VV-B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal voltage (Un)</td>
<td>kV</td>
<td></td>
</tr>
<tr>
<td>3-phase system</td>
<td>3.0 – 6.0</td>
<td>13.8 – 36.0</td>
</tr>
<tr>
<td>Rated voltage, max.</td>
<td>kV</td>
<td></td>
</tr>
<tr>
<td>3.6 – 17.5</td>
<td>17.5 – 40.5</td>
<td></td>
</tr>
<tr>
<td>Threshold voltage (p-g and p-p)</td>
<td>kV</td>
<td></td>
</tr>
<tr>
<td>&gt; 0.6 kV</td>
<td>&gt; 1.5 kV</td>
<td></td>
</tr>
<tr>
<td>&lt; 45% Un</td>
<td>&lt; 45% Un</td>
<td></td>
</tr>
<tr>
<td>Nominal voltage (Un p-g)</td>
<td>kV</td>
<td></td>
</tr>
<tr>
<td>4.8 – 8.0</td>
<td>8.0 – 20.0</td>
<td></td>
</tr>
<tr>
<td>Threshold voltage (p-g)</td>
<td>kV</td>
<td></td>
</tr>
<tr>
<td>&gt; 1.0 kV</td>
<td>&gt; 1.5 kV</td>
<td></td>
</tr>
<tr>
<td>&lt; 78% Un</td>
<td>&lt; 78% Un</td>
<td></td>
</tr>
</tbody>
</table>

| Nominal frequency | Hz | 50 – 60 |
| Response time | s | < 1 at temperature –20°C and above |
| Short-time (symmetrical) | kA | 63 |
| Peak withstand current | kA | 164 |
| Operation temperature range | °C | –40 – +85 |
| Physical dimensions | mm | H: 92 × W: 63 × D: 38 |
| Net weight | g | 109 |

1) Only on not insulated (bare) circular-section conductors and on bars of width up to
2) Depending on pole distance (see recommended minimum clearances)
3) p-g voltage = phase-ground voltage; p-p voltage = phase-phase voltage
4) For pole distance ranges within limits given in installation and operation instructions
5) Rated withstand currents given are valid to VisiVolt™ indicators only and do not
VisiVolt™ Passive Voltage Indicator
Threshold Voltages - Example

Example:
VisiVolt™ type: VV-B
System $U_n = 15$ kV
45% $U_n = 6.75$ kV
VisiVolt™ Passive Voltage Indicator
Withstand voltages

<table>
<thead>
<tr>
<th>Rating</th>
<th>Power frequency</th>
<th>Impulse withstand</th>
<th>Recommended</th>
</tr>
</thead>
<tbody>
<tr>
<td>IEC</td>
<td>ANSI</td>
<td>IEC</td>
<td>ANSI</td>
</tr>
<tr>
<td>3.6 kV</td>
<td>10 kV</td>
<td>40 kV</td>
<td>100 mm</td>
</tr>
<tr>
<td>7.2</td>
<td>4.8 kV</td>
<td>19 kV</td>
<td>60 kV</td>
</tr>
<tr>
<td>12.0</td>
<td>8.3 kV</td>
<td>28 kV</td>
<td>75 kV</td>
</tr>
<tr>
<td>17.5</td>
<td>38 kV</td>
<td>95 kV</td>
<td>160 mm</td>
</tr>
<tr>
<td>24.0</td>
<td>15.5 kV</td>
<td>50 kV</td>
<td>95 kV</td>
</tr>
<tr>
<td>24.0</td>
<td>27.0 kV</td>
<td>60 kV</td>
<td>125 kV</td>
</tr>
<tr>
<td></td>
<td></td>
<td>70 kV</td>
<td>150 mm</td>
</tr>
<tr>
<td>36.0</td>
<td>70 kV</td>
<td>145 kV</td>
<td>290 mm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>170 kV</td>
<td>330 mm</td>
</tr>
<tr>
<td>40.5</td>
<td>80 kV</td>
<td>165 kV</td>
<td>320 mm</td>
</tr>
<tr>
<td></td>
<td>95 kV</td>
<td>190 kV</td>
<td>360 mm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>400 kV</td>
<td>400 mm</td>
</tr>
</tbody>
</table>

And do not supersede the requirements and specifications for the system the indicators...
VisiVolt™ Passive Voltage Indicator
Installation – current conductors and bars

On a circular-section conductor of small diameter

On vertical current bar using spacers
VisiVolt™ Passive Voltage Indicator
KIPTS (Koeberg Insulator Pollution Test Station)

- South Africa
- 04 2007
VisiVolt™ Passive Voltage Indicator
ABB SECTOS outdoor switch-disconnectors, Poland

- December 2006, May 2007
VisiVolt™ Passive Voltage Indicator
Aquarina – Testing station in Florida

- Solar Radiation – 900 W / m²
- Thermal Cycling
- Moisture
- Salt Fog -
- Wind

Figure 1 – Aquarina Test Site

Figure 4 – VisiVolt Energized at 13.8 kV (Phase to Ground)
VisiVolt™ Passive Voltage Indicator
110/15kV Substation, Niepołomice, Poland

- March 2007
  15kV busbar bridge       15/0.4kV auxiliary transformer
  (voltage not present yet)
VisiVolt™ Passive Voltage Indicator

Advantages of VisiVolt™

Differentiating features of the product:

- Both indoor and outdoor application possibility
- Reflective display of good visibility under all lighting conditions (from dim indoor to bright outdoor)
- Large display size – visibility from long distance (e.g. on a pole mounted equipment)
- No electronic circuit – display element is the sensitive element
- All polymer components – no steel parts – no risk of corrosion
VisiVolt™ Passive Voltage Indicator
Main functions & marketing points

- Warning function – increased safety
  - Higher level of safety of operating and servicing the system.

- Check of voltage status
  - Without using any additional equipment, the personnel can check the status of voltage presence.

- Confirming of equipment operation
  - At equipment with no visible gap (e.g. Sectos switch disconnector) VisiVolt confirms the correct operation of the switch and disconnector.
VisiVolt™ Passive Voltage Indicator
To prevent accidents

- VisiVolt can prevent accidents by providing visualization of voltage presence at service points
  - In an unexpected situation can warn the personnel about the presence of voltage before it is too late.
  - Discourage the personnel from breaking the safety rules (e.g. working unprotected to close to a live system)
- VisiVolt was part of the US ABB campaign: „Engineered for Safety“
VisiVolt™ Passive Voltage Indicator
Presence in the market

Orders 2006-2008
Power and productivity for a better world™