**BIPOLAR INSULATION GUARD FOR LIVE NON-GROUNDED DC NETWORKS**

**KPM169C2x**

- For 12, 24 or 48VDC battery systems
- Precision reading unaffected of system voltage
- All inputs and outputs fully isolated
- Triple-zone insulation monitoring and Supervision relay
- “Pathfinder” Indicates polarity of dominant earth fault
- Response time: 125-165mS
- Analogue output proportional to meter reading (F-versions)

**Specifications**

- **Auxiliary Supply:** Nom: 12-48VDC as standard (>9-<60VDC, Fuse 2A)
- **Optional Voltage:** 100-120, 200-240, 380-415 or 440-460VAC, 40-70Hz (Fuse 0,5A)
- **Supply tolerance:** ± 10%
- **Power rating:** 1,5VA
- **Contact rating:** AC: 100VA - 250V/2A max. DC: 50W - 100V/1A max.
- **Analogue Output:** Up to 20mA, max 500R
- **(other on request)** Up to 10V, min 100kohm
- **Temperature:** -20 to +70°C
- **Weight:** 0.62kgs
- **Front protection:** IP52 (IP65 optional)

**Application**

The digitally controlled KPM169C2x monitors insulation level between a live non-grounded (IT) battery or live DC network and its protective earth.

Only ONE KPM169C2x can be connected to the same DC-system. An AC or DC (standard) auxiliary voltage is required for the unit. A green LED indicates AUX POWER on. Start of monitoring function is delayed when auxiliary power is switched on (default 2 secs delay). In this way false tripping during power up, caused by initial charging of network spread capacitance, is avoided.

The DIN96 front-panel mounted instrument reads the insulation level directly in kΩ. The meter has reflection free glass. The ohmmeter and the triple-zone status LEDs at a glance gives the clear safety message:

- **ALARM** (red zone)
- **WARNING** (yellow zone)
- **HEALTHY** (green zone)

**General**

**SEV MEASURING PRINCIPLE**

Insulation is measured between the complete galvanically interconnected DC network and its protective earth. The signal flows to ground via the path of the insulation fault, the level of flow expresses the insulation resistance, the direction of flow expresses the fault polarity. The measuring accuracy is not influenced by any normal kind of load attached to the network. The detection time for an insulation fault is 125-165mS.

**PATHFINDER / POLARITY FUNCTION**

During a Warning or Alarm condition the Polarity LED indicates the polarity causing the trip:

- **POSITIVE EARTH FAULT:** LED not lit
- **NEGATIVE EARTH FAULT:** blue LED lit

**RELAY OUTPUTS**

The unit has non-latching C/O relay outputs for Warning (R1), Alarm (R2) and System Error (R3). The Alarm and error relays are fail to safety configured. A trip LED flashes when the trip level is passed, the relay trips after elapsed delay. The timer resets if the fault is removed during countdown. Trip levels and delays are settable on unit rear. Recommended trip level settings will depend on application and priority of safety hazards.

**ANALOGUE OUTPUT**

All F Versions have an isolated analogue output proportional to meter reading.

**SYSTEM SUPERVISION**

If voltage of the monitored DC system not connected to the unit input or is to low, the NEG POLARITY LED will flash red, and relay 3 (System Error) will trip. If polarity of the input connection reversed, the NEG POLARITY LED will flash red and blue, and relay 3 will trip. Trip of relay 3 will inhibit operation of the warning and alarm relay and their respective trip LEDs.

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ELECTRONIC CONTROL AND INSTRUMENTATION
BIPOLAR INSULATION GUARD FOR LIVE NON-GROUNDED DC NETWORKS

KPM169C2x

Relay and LED Operation

POWER OFF
All LED’s are off. Relays shown de-energised.

POWER ON
The GREEN LED (POWER) will lit when unit is powered in normal condition (Positive Polarity). Fail Safe relays R2 and R3 are activated.

*) NB! The BLUE LED (NEG POLARITY) will also lit if the unit detect a minor earth fault.

WARNING POSITIVE
The YELLOW LED (WARNING) flashes when the trip level is passed, the warning relay R1 trips after elapsed delay. Steady light after countdown.

WARNING NEGATIVE
The BLUE LED (NEG POLARITY) will lit and the YELLOW LED (WARNING) flashes when the trip level is passed, the warning relay R1 trips after elapsed delay. Steady light after countdown.

ALARM POSITIVE
The RED LED (WARNING) flashes when the trip level is passed, the warning relay R2 trips after elapsed delay. Steady light after countdown.

ALARM NEGATIVE
The BLUE LED (NEG POLARITY) will lit and the RED LED (WARNING) flashes when the trip level is passed, the warning relay R2 trips after elapsed delay. Steady light after countdown.

FAULT STATUS / SYSTEM ERROR
The NEG POLARITY LED (RED) flashes, this indicates missing measuring voltage (positive or negative) and status relay R3 will activate. In this mode the unit will not indicate any earth fault.

FAULT STATUS / SYSTEM ERROR
The NEG POLARITY LED flashes and changes colour between BLUE and RED. This will indicate reserved polarity and status relay R3 will activate. In this mode the unit may indicate earth fault but alarm and warning relays will not be activated.

The MEGACON policy is one of continuous improvement, consequently equipment supplied may vary in detail from this publication.
**Description**

**KPM169C2x models for 9-60VDC**

These units are used for industrial, marine and offshore installations. Start of monitoring function is delayed when auxiliary power is switched on (default 2 secs delay).

Direct connection for 12, 24 or 48VDC systems.

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**Output diagram**

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**Connection**

Relays shown de-energised, a fail-safe relay energises when unit is powered.

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**Output Operation**

Scale range: 0-30kΩ - 0 (>33kΩ)

<table>
<thead>
<tr>
<th>Warning</th>
<th>Alarm</th>
<th>System Error</th>
<th>Fail Safe</th>
<th>Latch</th>
</tr>
</thead>
<tbody>
<tr>
<td>R1</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R2</td>
<td>✓</td>
<td></td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

**Output table (example for 4-20mA)**

<table>
<thead>
<tr>
<th>Value (scale)</th>
<th>mA output</th>
</tr>
</thead>
<tbody>
<tr>
<td>0kΩ</td>
<td>20.00mA</td>
</tr>
<tr>
<td>2,5kΩ</td>
<td>16.41mA</td>
</tr>
<tr>
<td>5kΩ</td>
<td>13.66mA</td>
</tr>
<tr>
<td>10kΩ</td>
<td>11.56mA</td>
</tr>
<tr>
<td>15kΩ</td>
<td>9.91mA</td>
</tr>
<tr>
<td>20kΩ</td>
<td>8.56mA</td>
</tr>
<tr>
<td>25kΩ</td>
<td>6.51mA</td>
</tr>
<tr>
<td>30kΩ</td>
<td>4.42mA</td>
</tr>
<tr>
<td>open (&gt;33kΩ)</td>
<td>4.00mA</td>
</tr>
</tbody>
</table>

**Analogue Output**

KPM169C2F and KPM169C2GF have an analogue output proportional to meter reading. (Special outputs are available on request)

Add suffix from table below to type designation to specify output required:

<table>
<thead>
<tr>
<th>O/P</th>
<th>Range</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>O/P1</td>
<td>0 - 10mA</td>
<td>O/P6</td>
</tr>
<tr>
<td>O/P2</td>
<td>0 - 20mA</td>
<td>O/P7</td>
</tr>
<tr>
<td>O/P3</td>
<td>4 - 20mA</td>
<td>O/P8</td>
</tr>
<tr>
<td>O/P4</td>
<td>N/A</td>
<td>O/P9</td>
</tr>
<tr>
<td>O/P5</td>
<td>N/A</td>
<td>O/P10</td>
</tr>
</tbody>
</table>

**Dimensions**

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**ORDERING INFORMATION**

<table>
<thead>
<tr>
<th>Type</th>
<th>KPM169C2F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aux. Supply</td>
<td>24VDC</td>
</tr>
<tr>
<td>Network Voltage</td>
<td>24VDC</td>
</tr>
<tr>
<td>Analogue O/P</td>
<td>4-20mA</td>
</tr>
<tr>
<td>Range</td>
<td>-</td>
</tr>
</tbody>
</table>