fac3
GROUND FAULT MONITOR FOR DC CURRENT UNGROUNDED SYSTEMS

PROAT
**DESCRIPTION**

The FAC3 equipment is a ground fault monitor for DC current ungrounded installations from 25-1000 VDC. It detects ground fault of the (+) or (-) lines independently.

FAC3 has an automatic re-connection function, where it is checked if the isolation problem persists and the service is restored if possible. An unlimited attempts are done and reset interval is user selectable between 1-60 minutes. Note: there is available the model without automatic re-connection.

The FAC3 has the following output contact types for RL1 and RL2 by model:

<table>
<thead>
<tr>
<th>RL type</th>
<th>Without fault</th>
<th>With fault</th>
<th>After re-connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tipo 1X - RL1</td>
<td>disconnected</td>
<td>instant connection</td>
<td>not applicable</td>
</tr>
<tr>
<td>Tipo 1X - RL2</td>
<td>RL2 not present</td>
<td>RL2 not present</td>
<td>RL2 not present</td>
</tr>
<tr>
<td>Tipo X - RL1</td>
<td>disconnected</td>
<td>instant connection</td>
<td>instant disconnection</td>
</tr>
<tr>
<td>Tipo X - RL2</td>
<td>disconnected</td>
<td>temporized connection</td>
<td>instant disconnection</td>
</tr>
<tr>
<td>Tipo C - RL1</td>
<td>connected</td>
<td>instant disconnection</td>
<td>temporized connection</td>
</tr>
<tr>
<td>Tipo C - RL2</td>
<td>disconnected</td>
<td>temporized connection</td>
<td>instant disconnection</td>
</tr>
<tr>
<td>Tipo I - RL1</td>
<td>disconnected</td>
<td>1 pulse 250ms</td>
<td>disconnected</td>
</tr>
<tr>
<td>Tipo I - RL2</td>
<td>disconnected</td>
<td>disconnected</td>
<td>1 pulse 250ms</td>
</tr>
</tbody>
</table>

The isolation level is user adjustable between 20KΩ and 80KΩ. The auxiliary voltage is reference selectable: 24VDC or 230 VAC.

**APPLICATIONS**

- 25-1000 DC current ungrounded installations.
- Ungrounded systems including high leakage capacitances.
- Systems with power conversion components, such as rectifiers and inverters.
- AC fault detection on inverter systems.

**INSTALLED EQUIPMENT**

PROAT is the supplier of leading photo-voltaic systems domestic and international: Spain, Italy, France, Czech Republic, Poland, Mauritius and Canada. We are suppliers to major inverter manufacturers such as Xantrex, SMA, Gamesa and Sil liken among others.

**KEY FEATURES**

- Monitors (+) and (-) lines independently.
- Connects one or two output relays switched instantaneously when a fault is detected.
- The output contact is potential free.
- Different switching outputs types available.
- Auto re-connection time user selectable (1-60 min.).
- Actuation level user selectable between 20K and 80K.
- Front buttons: Test button to simulate a ground fault and a Reset button to disconnect LEDs and output relays.
- Front lights: has three LEDs which store the fault produced by (+) and / or (-) lines and power.
- Protection fuse.
- Terminals faceplate.
- Plastic housing for DIN rail installation.
**SOLUTIONS**

**Industry**
The FAC3 equipment can be used for monitoring any ungrounded DC system, such as industrial battery systems, industrial components, rectifiers, etc.

**Photo-voltaic**
In photo-voltaic systems, due to the large number of panels and wiring needed for the inter-connection possible ground fault failures are high.

In addition, the peak performance for inverters derives in voltages range from 600-1000 VDC. That causes a potential risk for installation and maintenance facility staff.

PROAT manufactures interrupters type NMI and NIPS which integrates a FAC3 equipment.

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**OUTPUT SWITCHING TYPES**
Depending on the installation type and the action needed, there are the following contact types:

- **Type 1X**: for facilities requiring a single output relay without automatic reset.
- **Type X**: inverter appropriate relay action.
- **Type C**: for interaction with interrupters or inverters which require permanent signaling.
- **Type I**: for interaction with motorized interrupters or inverters that disconnect or short-circuit the PV.

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**WIRING DIAGRAMS**

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**CERTIFICATIONS**

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**TWO YEARS WARRANTY**
FRONT VIEW AND WIRING

- Mounting box in OMEGA DIN EN 50022.
- Self-extinguishing plastic VO class.
- H: 60mm, L: 106mm, P: 90mm.

MAINTENANCE
Every six months or during the regular checkups is recommended to press TEST key to verify that the equipment works properly.

REFERENCE SELECTOR TABLE
PROAT manufactures all the references combination from the following options table:

<table>
<thead>
<tr>
<th>Model</th>
<th>Monitored voltage</th>
<th>Contact type</th>
<th>Auxiliary voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>120</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>200</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FAC3</td>
<td>400</td>
<td>1X</td>
<td>230VCA (por defecto)</td>
</tr>
<tr>
<td></td>
<td>600</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td></td>
<td>800</td>
<td>I</td>
<td>24VDC</td>
</tr>
<tr>
<td></td>
<td>900</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1000</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Example: FAC3 model with monitoring voltage up to 1000 volts with output contact type C and auxiliary power of 230VCA, has the following reference:

FAC3-1000-C
**TECHNICAL DATA**

**Dielectric Tests**
- VDC input against auxiliary voltage: 3k VDC
- VDC input against switching elements: 3k VDC
- Auxiliary voltage against switching elements: 3k VDC

**Voltage Ranges**
- Monitoring voltage $U_n$: $0.5^*U_n...U_n$
- Auxiliary voltage $V_{aux}$: AC 207...253 V
- Frequency range $V_{aux}$: 50...60 Hz
- Power consumption: ≤12 VA

**Response Values**
- Response value $I_n$: 20...80 kΩ
- Measurement error ($I_n$): ±3kΩ
- Response time $T_n$: <100 ms
- Switching time $RL_1$ (type 1X): <100 ms
- Switching time $RL_2$ (type 1X): not aplicable
- Switching time $RL_2$ (type X): 1-4seg.
- Switching time $RL_1$ (type C): <100 ms
- Switching time $RL_2$ (type C): 1-4seg.
- Switching time $RL_1$ (type I): <100 ms
- Switching time $RL_2$ (type I): <100 ms
- Pulse duration $RL_1, RL_2$ (type I): 250 ms
- Re-connection time $T_{rr}$: 1...60 min.

**Measuring Circuit**
- Internal resistance $R+$: 1,5 MΩ
- Internal resistance $R-$: 1,5 MΩ
- Impedance to ground $IT$: 750 MΩ
- Monitoring voltage $U_n$: $U_n+10\%$
- Permissible system leakage capacitance: not affected

**Frontal View**
- Signal type: 3 leds
- $V_{aux}$: green led
- Fault to (+): red led
- Fault to (-): red led
- Test button: Yes
- Reset button: Yes

**Switching Elements**
- Number of switching elements: 1-2 elements
- Type of switching elements: commuted
- Voltage outputs: voltage free
- Rated contact voltage: 250 VAC/300 VDC
- Making capacity: 5A
- Electrical service life, number of cycles: 20.000.000
- Breaking capacity: 2A, AC239 V
- 0.4-0.2A, DC220 V

**General Data**
- Operating mode: continuously
- Mounting: DIN rail
- Connection: screw M2,5
- Maximum torque: 0,4 Nm
- Protection grade: IP20
- Flammability class: UL94V-O
- Weight: 310 g. aprox.
- Operation temperature: -5ºC ... +55ºC
- Storage temperature: -20ºC ... +80ºC
- Relative humidity (without condensation): <95%
- Setting values method: front opening

**Ruling**
- Emissions EMC: EN50081
- Interferences immunity EMC: EN50082-1
- Low Voltage: BT standard

**Factory Settings**
- Response value: 80 KΩ
- Re-connection time: 1 minute
- Timing $RL_2$: 1 second

**MORE INFORMATION:**
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