INSTRUCTION BOOKLET

AQ 0x SERIES – Arc Sensors
This booklet describes only the AQ 0x series sensors for AQ 100 series arc protection system. It is important to read through instruction manuals of AQ 100 series units.
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1 ARC SENSORS

AQ 100 series provides choice of different types of arc sensors to be utilized in different units and different switchgear types according to specific application requirements. Available sensor types are arc light point sensors and arc light fiber optic loop sensors.

Arc light point sensors are typically installed in metal clad compartments providing quick accurate location of the faulted area. Arc light fiber loop sensors are installed typically to cover a wider protected area with one fiber when no need for more exact fault location exists.

1.1 ARC LIGHT POINT SENSOR AQ 01

AQ 01 is an arc light point sensor with a light sensitive photodiode element activated by arc light. AQ01 arc sensors should be mounted in the switchgear cubicles in such a way that the light sensitive part covers the protected area as completely as possible. One sensor per closed metal clad compartment should be utilized. In open spaces, such as the bus bar section, arc sensors should be mounted maximum 2 meters apart.

The fixed light sensitivity of the AQ01 sensor is 8000 Lux. Sensor does not require user settings. Detection radius is 180 degrees.
1.1.1 AQ 01 INSTALLATION AND WIRING

AQ 01 is installed either on the compartment wall or through wall. Example of wall mounting is seen in Figure 1-2. AQ 01 is fixed to the wall using two screws. The same screw pattern is utilized in through wall mounting arrangement as well. Unit is turned around and the eye is pushed to the compartment to be protected and two screws are attached from the back side of the sensor. No external mounting plates are needed in any case.
AQ01 comes without connection cable. Connection cable installation at site is simple. Cable connectors are located beneath the covers that can be conveniently detached for fastening the sensor wires. Cover shall be attached after installing the wires. Cable connectors are located at both ends of the sensor for series connecting maximum three sensors in one line. See Figure 1-1.
1.1.2 AQ 01 TECHNICAL DATA

<table>
<thead>
<tr>
<th>Light intensity threshold</th>
<th>8000Lux/25000Lux/50000Lux</th>
</tr>
</thead>
<tbody>
<tr>
<td>Detection radius</td>
<td>180 degrees</td>
</tr>
<tr>
<td>Mechanical protection</td>
<td>IP 64</td>
</tr>
<tr>
<td>Sensor wiring arrangement</td>
<td>2 wires and shield</td>
</tr>
<tr>
<td>Sensor cable specification</td>
<td>Shielded twisted pair 0.75mm²</td>
</tr>
<tr>
<td>Maximum sensor cable length per sensor channel</td>
<td>200 meters</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>-20...+85°C</td>
</tr>
</tbody>
</table>

1.2 ARC LIGHT FIBER OPTIC LOOP SENSOR AQ 06

AQ 06 is an arc light fiber optic loop sensor. AQ 06 fiber is a plastic fiber optic cable. AQ 06 sensors can be ordered in pre-manufactured lengths of 1-40 meters. AQ 06 fiber sensors are distributed through the protected switchgear cells. AQ 06 is not recommended to be cut and/or spliced on site. If cutting/splicing is necessary due to accidental breakage please contact your nearest Arcteq representative.

The fixed light sensitivity of the AQ06 sensor is 8000 LUX. Sensor does not require user settings. Detection radius is 360 degrees. See Figure 1-3.
Figure 1-3 AQ06 arc light fiber optic loop sensor

Note: On request AQ 06 ends can be covered with black rubber part for any requested portion to avoid light detection outside the protected zone. For more information consult your nearest Arcteq representative.

1.2.1 AQ 06 TECHNICAL DATA

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light intensity threshold</td>
<td>8000Lux</td>
</tr>
<tr>
<td>Detection radius</td>
<td>360 degrees</td>
</tr>
<tr>
<td>Maximum length</td>
<td>40 meters</td>
</tr>
<tr>
<td>Diameter</td>
<td>1 millimeter</td>
</tr>
<tr>
<td>Bending radius</td>
<td>5 centimeters</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>-10...+85°C</td>
</tr>
</tbody>
</table>
1.3 ARC LIGHT FIBER OPTIC LOOP SENSOR AQ 07

AQ 07 is an arc light fiber optic loop sensor. AQ 07 fiber is a robust fiber optic cable providing practically unlimited bending radius. AQ 07 contains hundreds of glass fiber drains covered by a plastic tube making it extremely strong. AQ 07 sensors can be ordered in pre-manufactured lengths of 1-50 meters. AQ 07 fiber sensors are distributed through the protected switchgear cells. AQ 07 is not recommended to be cut and/or spliced on site. If cutting/splicing is necessary due to accidental breakage please contact your nearest Arcteq representative.

The fixed light sensitivity of the AQ07 sensor is 8000 LUX. Sensor does not require user settings. Detection radius is 360 degrees. See Figure 1-4.

![AQ07 arc light fiber optic loop sensor](image)

Figure 1-4 AQ07 arc light fiber optic loop sensor

Note: On request AQ 07 ends can be covered with black rubber part for any requested portion to avoid light detection outside the protected zone. For more information consult your nearest Arcteq representative.
1.3.1 AQ 07 TECHNICAL DATA

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Light intensity threshold</td>
<td>8000 Lux</td>
</tr>
<tr>
<td>Detection radius</td>
<td>360 degrees</td>
</tr>
<tr>
<td>Maximum length</td>
<td>50 meters</td>
</tr>
<tr>
<td>Diameter</td>
<td>1.2 millimeters</td>
</tr>
<tr>
<td>Bending radius</td>
<td>1 centimeter</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>-40...+85°C</td>
</tr>
</tbody>
</table>

1.4 ARC LIGHT FIBER OPTIC LOOP SENSOR AQ 08

AQ 08 is an arc light fiber optic loop sensor. It is developed to withstand temperatures of up to 125 degrees Celsius and is therefore suitable for installation in e.g. wind turbine windings. AQ 08 fiber is a robust fiber optic cable providing practically unlimited bending radius. AQ 08 contains hundreds of glass fiber drains covered by a plastic tube making it extremely strong. AQ 08 sensors can be ordered in pre-manufactured lengths of 1-40 meters. AQ 08 fiber sensors are distributed through the protected switchgear cells. AQ 08 is not recommended to be cut and/or spliced on site. If cutting/splicing is necessary due to accidental breakage please contact your nearest Arcteq representative.

The fixed light sensitivity of the AQ08 sensor is 8000 LUX. Sensor does not require user settings. Detection radius is 360 degrees. See Figure 1-5.
Figure 1-5 AQ08 arc light fiber optic loop sensor

Note: On request AQ 08 ends can be covered with black rubber part for any requested portion to avoid light detection outside the protected zone. For more information consult your nearest Arcteq representative.

1.4.1 AQ 08 TECHNICAL DATA

<table>
<thead>
<tr>
<th>Light intensity threshold</th>
<th>8000Lux</th>
</tr>
</thead>
<tbody>
<tr>
<td>Detection radius</td>
<td>360 degrees</td>
</tr>
<tr>
<td>Maximum length</td>
<td>40 meters</td>
</tr>
<tr>
<td>Diameter</td>
<td>1.2 millimeters</td>
</tr>
<tr>
<td>Bending radius</td>
<td>1 centimeter</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>-40...+125˚C</td>
</tr>
</tbody>
</table>
1.5 SENSOR TYPE DEPENDENCIES

Different sensor types can be utilized in different arc flash protection units of the AQ 100 series. The table below describes the dependencies.

Table 1-1: Arc sensor dependencies

<table>
<thead>
<tr>
<th></th>
<th>AQ 01</th>
<th>AQ06</th>
<th>AQ07</th>
<th>AQ08</th>
</tr>
</thead>
<tbody>
<tr>
<td>AQ101</td>
<td>Yes</td>
<td>Yes (with fiber option)</td>
<td>Yes (with fiber option)</td>
<td>Yes (with fiber option)</td>
</tr>
<tr>
<td>AQ102</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>AQ110P</td>
<td>Yes</td>
<td>Yes (with fiber option)</td>
<td>Yes (with fiber option)</td>
<td>Yes (with fiber option)</td>
</tr>
<tr>
<td>AQ110F</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>
2 SENSOR CONNECTION

2.1 ARC LIGHT POINT SENSOR AQ01 CONNECTION

1) Open the sensor side-covers, then detach the pluggable connectors from the sensor PCB, and prepare the three-twisted shielded pair cable connecting. (See Figure 2-1)

2) Before connecting the cable to connector, make sure that the connecting order is right (+, signal, shield). The appropriate pins information is shown on the bottom shell of the sensor. Plug the wires into connector and fasten them by using the screw driver. (See Figure 2-2)
3) Connect the other end of the cable to a sensor channel on AQ101 or AQ110P unit. (See Figure 2-3)
4) Check the front panel of the unit, only POWER LED turns on at this moment. (See Figure 2-4)
5) Attach the connector back to the sensor PCB. (See Figure 2-5)

Figure 2-5

6) After connecting the sensor to unit, the ERROR LED turns on, and the appropriate sensor channel LED starts to blink (e.g., S1 LED). (See Figure 2-6)

Figure 2-6
7) Press and hold the SET push button on the front panel for 2 seconds in order to run system auto-configuration setting (See Figure 2-7). The unit memorizes the sensor amount and Binary input lines connected (if any).

8) After completing the system auto-configuration setting, close both end side-covers back. (See Figure 2-8)
9) A maximum amount of 3 arc sensors can be daisy-chained to the same sensor input on the AQ101 unit. (See Figure 2-9)

![Figure 2-9](image)

The Auto Configuration is a part of the Self Supervision Function which is making sure that all connections and sensors at all time are fully functional and ready to operate.
3 ORDERING CODE

Sensor function
1 Light point sensor unit
2 Pressure & light point sensor unit
3 Reserved for future use
4 Reserved for future use
5 Reserved for future use
6 Plastic fiber optic loop sensor
7 Glass fiber optic loop sensor
8 Glass fiber optic loop sensor (high temperature)
9 Reserved for future use

Light intensity threshold (only for AQ01 and AQ02)

a 8000 Lux
b 25000 Lux
c 50000 Lux

Cable length
x See the min and max lengths in the instruction manual
4 REFERENCE INFORMATION

Manufacturer information:
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