Safe and secure distribution of medium voltage with AX1
AX1 is a modern, air-insulated switchgear that lies at the very front line of safety and security – safety for operating personnel and security for reliable distribution. The reason behind this is simple. Intelligent, built-in functions for tripping, interlocking, alarms, operational information, maintenance needs and arc protection.

This intelligence is found in the panel computers. There’s one included in every AX1 panel and each is served by a range of sensors that gather a variety of useful information. The panel computers process this information and then decide what measures need to be taken. Furthermore, this monitoring is continuous. When AX1 switchgear is up and running, it takes care of its operation all by itself.

AX1 also offers many other benefits, not the least of which is an active arc protector that eliminates an internal arc within 5 ms. The arc is short-circuited to earth and the fault current is then interrupted in the normal way.

... with minimal maintenance needs

Thanks to its continuous monitoring, AX1 has no need for traditional periodic maintenance. Instead, the panel computers keep a watchful eye on the status of the switchgear and warn in plenty of time if inspection or service is required. But as AX1 is essentially maintenance-free, such service hardly ever needed.
The low maintenance requirement naturally contributes to cutting the overall life-time costs for AX1 switchgear. But AX1 can also offer further cost-saving benefits:

- The compact main-circuit enclosure saves space.
- Thanks to the arc eliminator, costs for a pressure relief system are avoided and the choice of switchgear location is widened.
- The auxiliary power system and cross-connection are built into the switchgear’s support panel.
- The tubular busbars with their unique coil spring contacts simplify installation.
- All AX1 panels are fully function-tested prior to delivery and thus easy to bring into operation.

If we look ahead, even far into the future, we will also discover that AX1 is well-prepared for profitable decommissioning. Recyclable materials have been used throughout its construction.
No one should be exposed to unnecessary risks when carrying out their work. AX1 has thus been designed to effectively minimise all risks.

Complete personal safety in a switchgear can only be achieved if all live primary circuits are shielded from accidental personal contact. An additional requirement is that arcing is taken care of in such a way that a person at or close to the switchgear is not injured.

Protection against accidental contact in AX1 is achieved by placing all primary circuits in the panel’s main-circuit enclosure. Furthermore, the power cable connections are single-phase encapsulated with an earthed outer layer for additional personal safety.

For active personal protection against an open arc, AX1 features an extremely fast arc eliminator. If an open arc occurs within the switchgear, all three phases are earthed so quickly that a dangerous pressure increase doesn’t have time to build up and hot and poisonous arc gases don’t have time to form.

In other words, a switchgear room with an AX1 switchgear is a safe place of work.

All medium voltage is located in the separate main-circuit enclosure, shielded from accidental contact and protected from the environment and other external influences.

Many forward-thinking operational managers must have dreamt about switchgear that takes care of itself. Today, their dreams have become reality.

AX1 switchgear is fully supervised by its own panel computers so no periodic inspection is ever needed. Operational reliability increases at the same time as maintenance costs decrease.

That’s the way all modern switchgears should perform.
AX1 for processing industries
Reliable operation ...

Switchgear has an important task in a production process. It is to ensure that a supply of electricity is always available.

AX1 employs modern technological solutions in its primary function, distributing medium voltage, as well as in all its operating and supervisory functions. The circuit-breaker is available in both SF6 and vacuum designs, each of which features the very latest technology. The operating mechanism is easy to access behind the front panel and can be replaced during operation.

The panel computers constantly check that everything is working as it should. If something unexpected does occur, they alert operating personnel in good time for appropriate measures to be taken.

An additional reason for the high availability of AX1 is its unique arc eliminator. If an arc should occur inside an AX1 panel, it is earthed so quickly that thermal or mechanical damage has no time to arise. AX1 switchgear can thus be brought back into operation again immediately following an arc fault as long as the fault that caused the arc is remedied.

... gives profitable production

AX1 means a secure supply of electricity. Its need for only minimum maintenance saves costs. Put the two together and you have a solid foundation for profitable production.

By communicating with the panel computers, operating personnel can quickly gather the information they need to judge the status of the switchgear.

The arc eliminator has three very fast earthing switches integrated one per phase in the busbar support insulators.
For small spaces ...

An oilrig only has a limited amount of space. That's why AX1 offers the ideal solution. Its tubular busbar design has made it possible to shrink panel dimensions dramatically and AX1 now boasts the market's smallest size compared with other switchgears of equivalent rated data.

Its small size means that AX1 can be integrated into a 24 ft standard container without problem. Apart from saving space, this also simplifies installation since the switchgear is fully-assembled in the container on delivery. The only on-site activity remaining is to connect the power cables.

... in harsh environments

To ensure trouble-free operation in even the toughest conditions, AX1 is rigorously tested and in compliance with IEC and UL demands. In addition, complete panels of AX1 have been tested and approved according to DNV’s requirements.
Several aspects of AX1 switchgear contribute to its simple assembly. Its modular construction means that the lower frame is a completely separate part that can be fitted in place in advance. Fitting the cable end connections can thus be completed while enjoying the best possible access before the rest of the switchgear is installed.

The tubular busbars with their unique coil spring contacts simplify joining the panels to one another. All internal wiring in the panels is already in place at delivery and is joined together with snap connections during on-site installation. Cross-connecting takes place in the switchgear’s support panel, where all external wiring for communication with the switchgear is connected. The auxiliary power system can also be located in the support panel, a simple and space-saving solution.

Naturally, the complete switchgear is function-tested at the factory prior to delivery to facilitate bringing it into operation.

Coil spring contacts simplify connecting busbars between panels.

... without the need for pressure relief

The active arc protection of AX1 means that dangerous pressure increases never have a chance to build up and that harmful arc gasses cannot arise should an internal open arc occur within the switchgear. This eliminates the need for a pressure relief system, which both saves space and simplifies the location and installation of the switchgear.

By placing the panel’s lower frame in position in advance, the cable end connections can be completed quickly and simply before the rest of the switchgear is installed.

Support panel with cross connections and auxiliary power system.
AX1 has been developed with full respect for the environment. Recyclable material has been used throughout and its design minimises the total operating losses over the switchgear’s life-time. Comparative Life Cycle Assessments (LCA) show that the total environmental load of AX1 is approximately 50% of that of equivalent switchgears with a conventional construction.

### Technical data

<table>
<thead>
<tr>
<th></th>
<th>12 kV</th>
<th>24 kV</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Rated voltage</strong></td>
<td>12 kV</td>
<td>24 kV</td>
</tr>
<tr>
<td><strong>Rated current</strong></td>
<td>630 - 3150 A</td>
<td>630 - 3150 A</td>
</tr>
<tr>
<td><strong>Short-time current</strong></td>
<td>16 - 40 kA or 50*, 3 s</td>
<td>16 - 40 kA or 50*, 3 s</td>
</tr>
<tr>
<td><strong>Open arc test</strong></td>
<td>16 - 40 kA or 50*, 1 s</td>
<td>16 - 40 kA or 50*, 1 s</td>
</tr>
</tbody>
</table>

*If specific customer requirements

### Dimensions

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Height</strong></td>
<td>2040 / 2240 mm with lower frame 600 / 800 mm</td>
</tr>
<tr>
<td><strong>Depth</strong></td>
<td>1050 mm</td>
</tr>
<tr>
<td><strong>Width</strong></td>
<td>650 / 975 mm</td>
</tr>
</tbody>
</table>

Certain functions described in the text and certain illustrations of the AX1 panels are not part of the standard configuration. We retain the right to make changes in the design, dimensions and technical data without prior notice.

ABB Power Technology Products
Medium Voltage Products
SE-771 80 Ludvika, Sweden
Tel: +46 240 78 20 00
Fax: +46 240 78 40 21
Internet: www.abb.com/mediumvoltage