UFES

Active protection for switchgear

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S3 – Speed, Safety, Savings

UFES™ – Ultra-Fast Earthing Switch

UFES electronics type QRU100
- Standard electronic tripping unit for the combination with ABB arc protection system REA
- 2 Optolink inputs for connection of the REA101 relay
- 2 High-speed inputs (HSI)
- Self-monitoring
- Optolink supervision
- Testing mode for functional check
- DP switch configuration
- Ideal for extension of existing ABB arc protection systems
- Alternative: Fault detection by non-ABB system (Compatibility verification required)

UFES primary switching element type U1
- Ultra-fast operating mechanism with micro-gas generator
- Vacuum interrupter
- Compact design
- Versatile in installation
- Long service life

ABB arc protection system REA
- Optical detection via line or lens sensors
- Overcurrent detection
- Selective protection
- Circuit-breaker failure protection

UFES electronics type QRU1
- Alternative electronic detection and tripping unit
- 3 current inputs
- 9 optical inputs for light detection by lens sensors
- Complete solution for simple protection zones
- For large protection zones expandable up to 159 lens sensors with ABB arc guard type TVOC-2
- Self monitoring
- Testing mode for functional check
- DP switch configuration
- Fast fault localization

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The occurrence of an arc fault, the most serious fault within the electrical system, requires immediate action to prevent severe effects on the system and its components. An arc fault can lead to the melting of metal parts, resulting in high temperatures and pressures, as well as the release of toxic substances and hot gases. To mitigate these risks, a new active arc fault protection device for switchgear, the Ultra-Fast Earthing Switch (UFES), is introduced. This device is designed to protect persons and equipment by almost immediately extinguishing the arc fault (Extinguishing time < 4 ms after detection). This extension enables a passive protected zone to preserve the greatest possible competitiveness, especially during or after maintenance work.

The Ultra-Fast Earthing Switch of type UFES is a combination of an electronic device and the corresponding primary switching elements which initiate a 3-phase short-circuit to earth in the event of a fault. The extremely short arc extinction within ≤ 4 ms (after detection) enables a passive protected zone. This strategy is particularly useful in medium voltage switchgear systems with an internal arc fault current of 130 kA (peak) / 50 kA (rms). The UFES protection zone is characterized by:

- Minimization of pressure rise and gases in the faulty compartment and surrounding switchgear building,
- Avoidance of the severe effects of an arc fault, such as:
  - Extreme pressure
  - Temperature rise up to 20,000 °C
  - Combustion / vaporization of metal and insulating material
  - Release of substances and hot gases
- Unbeatable advantages:
  - Highly increased system and process availability – to preserve the greatest possible competitiveness
  - Highly increased operator safety for switchgear – especially during or after maintenance work
  - Drastically reduced repair costs – by minimizing the effects of faults on the system

Ultra-Fast Earthing Switch UFES primary switching elements for one phase.

<table>
<thead>
<tr>
<th>Type</th>
<th>Rated peak withstand current kA</th>
<th>Rated short-time withstand current (rms) kA</th>
<th>Rated frequency Hz</th>
<th>Rated short-circuit making current kA</th>
</tr>
</thead>
<tbody>
<tr>
<td>UFES primary switching element (type 7)</td>
<td>200</td>
<td>100</td>
<td>50 / 60</td>
<td>200</td>
</tr>
<tr>
<td>UFES primary switching element (type 8)</td>
<td>200</td>
<td>100</td>
<td>50 / 60</td>
<td>200</td>
</tr>
</tbody>
</table>

Selection of retrofit solutions
Particularly for older, non-IAC qualified switchgear systems, the Ultra-Fast Earthing Switch allows the highest degree of protection for equipment and operator safety to be achieved. A variety of solutions are available for retrofitting of existing switchgear systems:

- ABB Service Box, top mounted
- ABB withdrawable solution
- Separate panel with UFES draw-out unit
- UFES installation in a top box with direct connection to the busbar
- Separate panel with UFES draw-out unit

ABB components
- The Ultra-Fast Earthing Switch can also be provided as a loose CEM component. There are different Types of UFES kits available.

New ABB switchgear
- Also for new ABB switchgear, the integration of UFES is a useful supplement in order to protect this investment against the impacts of an internal arc, and in addition, to increases the operator safety to a maximum. For switchgear of type Unigear ZS1 for example, the following technical solutions are available:
  - ABB Service Box up to 24 kV
  - Universally usable ABB UFES Service Box for retrofitting of air-insulated switchgear

ABB Service withdrawable solutions
The UFES primary switching elements, installed in ABB withdrawable assembly or truck design, provides a simple opportunity to upgrade existing switchgear systems with active arc fault protection.

- The contact with the busbars is established via the isolating contacts of the withdrawable assembly.
- The optimum Plug & Play solution when vacant panels are available.
- Similar solutions are also available for other switchgear types with trucks.
The occurrence of an arc fault, the most serious fault within a switchgear system, is mostly associated with extremely high thermal and mechanical stresses in the area concerned. A new, active arc fault protection system based on the know-how gained from decades of experience with the ABB vacuum interrupter and SF₆-insulated technology now effectively helps to avoid these negative effects if a fault should occur.

The Ultra-Fast Earthing Switch of type UFES is a combination of devices consisting of an electronic device and the corresponding primary switching elements which initiate a 3-phase short-circuit to earth in the event of a fault. The extremely short switching time of the primary switching element, less than 1.5 ms, in conjunction with the rapid and reliable detection of the fault, ensures that an arc fault is extinguished almost immediately after its onset (Extinguishing time < 4 ms after detection). This extension enables a passive protected compartment and surrounding switchgear building to be isolated from the faults on the system.

Aviation of the severe effects of an arc fault, such as:
- Release of substances and hot gases
- Burning / vaporization of metal and insulating material
- Temperature rise up to 20,000 °C
- Drastically reduced repair costs
- High increased operator safety for switchgear
- High increased system and process availability

Unbeatable advantages:
- Highly increased system and process availability – to preserve the greatest possible competitiveness
- Highly increased operator safety for switchgear – especially during or after maintenance work
- Drastically reduced repair costs – by minimizing the effects of faults on the system
- Minimization of pressure loss and gases if the faulty compartment and surrounding switchgear building are isolated from the faults on the system
- Release of substances and hot gases

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- ABB Service Box, top mounted
- ABB withdrawable solution
- Separate panel with UFES draw-out unit
- UFES installation in the cable connection compartment
- UFES installation in a top box with direct connection to the busbar

New ABB switchgear
Also for new ABB switchgear, the integration of UFES is a useful supplement in order to protect this investment against the impacts of an internal arc, and in addition, to increase the operator safety to a maximum. For switchgear of type Unisafe 251 for example, the following technical solutions are available:
- UFES installation in a top box with direct connection to the busbar
- UFES installation in the cable connection compartment
- Separate panel with UFES draw-out unit

UFES – Ultra-Fast Earthing Switch

<table>
<thead>
<tr>
<th>Electrical maximum characteristics for each voltage category</th>
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<tr>
<td><strong>Rated voltage (rms)</strong></td>
</tr>
<tr>
<td><strong>Number of closing operations 1</strong></td>
</tr>
<tr>
<td><strong>Service life expectation</strong></td>
</tr>
<tr>
<td><strong>Contact bounce time ms</strong></td>
</tr>
<tr>
<td><strong>Closing time ms</strong></td>
</tr>
<tr>
<td><strong>Dimension (diameter x height) mm</strong></td>
</tr>
<tr>
<td><strong>Rated duration of short-circuit s</strong></td>
</tr>
<tr>
<td><strong>Rated short-time withstand current (rms) kA</strong></td>
</tr>
<tr>
<td><strong>Rated short-circuit making current kA</strong></td>
</tr>
<tr>
<td><strong>Rated lightning impulse withstand voltage (peak) kV</strong></td>
</tr>
<tr>
<td><strong>Rated power frequency withstand voltage (rms) kV</strong></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Mechanical properties</th>
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</thead>
<tbody>
<tr>
<td><strong>Rated mechanical withstand voltage (peak) kV</strong></td>
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<tr>
<td><strong>Rated mechanical withstand voltage (rms) kV</strong></td>
</tr>
<tr>
<td><strong>Rated thermal withstand voltage (peak) kV</strong></td>
</tr>
<tr>
<td><strong>Rated thermal withstand voltage (rms) kV</strong></td>
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</tbody>
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<th><strong>Application</strong></th>
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<tr>
<td><strong>UFES application (example)</strong></td>
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<tr>
<td><strong>CB2</strong></td>
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1 ABB Service Box, top mounted  | 2 ABB withdrawable solution
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a switchgear system, is mostly associated with extremely
high thermal and mechanical stresses in the area concerned.
A new, active arc fault protection system based on the know-
how gained from decades of experience with the ABB vacuum
interrupter and SF6 technology now effectively helps to
avoid these negative effects if a fault should occur.

The Ultra-Fast Earthing Switch of type UFES is a combination
of devices consisting of an electronic device and the corre-
sponding primary switching elements which initiate a 3-phase
short-circuit to earth in the event of a fault. The extremely
short switching time of the primary switching element, less
than 1.5 ms, in conjunction with the rapid and reliable detec-
tion of the fault, ensures that an arc fault is extinguished
well before the first peak of the fault current. This extension
enables a passive protected switchgear compartment and surrounding switchgear building.

Avoidance of the severe effects of an arc fault, such as:
- Similar solutions are also available for other switchgear
- The optimum Plug & Play solution when vacant panels
- The contact with the busbars is established via the
- Non-proprietary application
- Separate panel with UFES draw-out unit
- UFES can be used as a loose CEM component. There are different types of UFES

Unbeatable advantages:
- Highly increased system and process availability – to preserve the greatest possible competitiveness
- Highly increased operator safety for switchgear – especially during or after maintenance work
- Reduction of repair costs – by minimizing the effects of faults on the system
- Minimization of pressure rise and gases if the faulty
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- Particularly for older, non-IAC qualified switchgear systems,

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New ABB switchgear
Also for new ABB switchgear, the integration of UFES is a
useful supplement in order to protect this investment against
the impacts of an internal arc, and in addition, to increase
the operator safety to a maximum. For switchgear of type
Unigear ZSTI for example, the following technical solutions
are available:
- UFES installation in a top box with direct connection to the
- UFES installation in the cable connection compartment
- Separate panel with UFES draw-out unit

ABB Service Box (up to 24 kV)
Universally usable ABB UFES Service Box for retrofitting of an insulated switchgear
- Non-proprietary application
- Maximum isolation flexibility to suit the space available

ABB Service withdrawable solutions
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- Fast fault localisation

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