UFES
Active protection for switchgear

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
- DIP switch configuration
- Ideal for extension of existing ABB arc protection systems

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
- DIP switch configuration
- Fast fault localization

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 AG
Oberhauener Strasse 33
40472 Ratingen, Germany
Phone: +49 2102 12-0
Fax: +49 2102 12-17 77
www.abb.com/mediumvoltage

Note:
We reserve the right to make technical changes or modify the contents of this document without prior notice. With regard to purchase orders, the agreed particulars shall prevail. ABB AG does not accept any responsibility whatsoever for potential errors or possible lack of information in this document. We reserve all rights in this document and in the subject matter and illustrations contained therein. Any reproduction, disclosure to third parties or utilization of its contents – in whole or in parts – is forbidden without prior written consent of ABB AG.

Copyright © 2015 ABB
All rights reserved.

UFES™ –
Ultra-Fast Earthing Switch
The active arc fault protection device for switchgear

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. An active arc fault protection system based on the know-how gained from decades of experience with the ABB vacuum interrupter and Ultra-Fast Earthing Switch 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 switching time of the primary switching element, less than 1.5 ms, in conjunction with the rapid and reliable detection of an arc fault, of the Ultra-Fast Earthing Switch allows the highest degree of safety for persons and equipment.

Unbeatable advantages:
- Shortly increased system and process availability
- To preserve the greatest possible competitiveness
- Increased operator safety for switchgear
- Highly increased system and process availability
- By minimizing the effects of faults on the system
- Minimization of pressure relief measures
- By application of active protection concepts

Avoidance of the severe effects of an arc fault, such as:
- - Intensive light / high acoustic stress
- - Release of particles and hot gases
- - Burning / vaporization of metal and insulating material
- - Temperature rise up to 20,000 °C
- - Minimization of pressure relief measures
- - By application of active protection concepts

Technical data:

<table>
<thead>
<tr>
<th>Rated voltage (rms)</th>
<th>220</th>
<th>130 (165)</th>
<th>104</th>
<th>104</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimension (diameter x height) mm</td>
<td>137 x 210</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rated peak withstand current kA</td>
<td>130 (165)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rated short-time withstand current (rms) kA</td>
<td>50 (63)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rated frequency Hz</td>
<td>50 / 60</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rated power frequency withstand voltage (rms) kV</td>
<td>42</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rated short-circuit making current kA</td>
<td>130 (165)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rated duration of short-circuit s</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Unbeatable advantages:
- Shortening the occurrence of an arc fault well before the first peak of the fault current.
- Example pressure curves, with and without UFES, in a comparison of an arc insulated medium voltage switchgear system with an internal arc fault current of 150 kA (peak) / 50 kA (rms) / 3 Primary switching elements for one phase.

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.

ABB withdrawable solutions:
- Maximum installation flexibility to suit the space available
- Non-proprietary application
- Separate panel with UFES drawn-out unit
- UFES installation in the cable connection compartment
- UFES installation in a top box with direct connection to the busbar

ABB Service Box (up to 24 kV)
- Universally usable ABB UFES Service Box for retrofitting of air-insulated switchgear
- Maximum installation flexibility to suit the space available
- Non-proprietary application
- Separate panel with UFES drawn-out unit
- UFES installation in the cable connection compartment

ABB withdrawable solutions:
- Maximum installation flexibility to suit the space available
- Non-proprietary application
- Separate panel with UFES drawn-out unit
- UFES installation in the cable connection compartment

ABB Service Box (up to 24 kV)
- Universally usable ABB UFES Service Box for retrofitting of air-insulated switchgear
  - Maximum installation flexibility to suit the space available
  - Non-proprietary application
  - Separate panel with UFES drawn-out unit

UFES applications:
- 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 ZS1 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
- 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 ZS1 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
The active arc fault protection device for switchgear

The occurrence of an arc fault, the most serious fault within a switchgear system, is mostly associated with extremely high thermal and mechanical stress in the area concerned. An active arc fault protection system based on the know-how gained from decades of experience with the ABB vacuum interrupter and @PowerFlex technology now effectively helps to avoid these negative effects if an arc 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 by application of active protection concepts ensures that an arc fault is extinguished by arcing within ≤ 4 ms (after detection) and the impacts of an internal arc, and in addition, to increase the operator safety to a maximum. For switchgear of type UniGear ZS1 for example, the following technical solutions are available:

Selection of retrofit solutions

- 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 retrofit of type UniGear ZS1 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
  - UFES installation in a top box with direct connection to the busbar

**UFES Applications**

- **ABB Service Box, top mounted**
- **ABB withdrawable solution**
- **Separate panel with UFES draw-out unit**
- **UFES installation in the cable connection compartment**
- **Non-proprietary application**
- **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**

**UFES Ultra-Fast Earthing Switch**

- **The Ultra-Fast Earthing Switch eliminates the arc fault well before the first peak of the fault current**
- **Example pressure curves, with and without UFES, in a compartment of an air insulated medium voltage switchgear system with an internal arc fault-current of 150 kA (peak) / 50 kA (rms)**
- **Primary switching elements for one phase**

**UFES – Ultra-Fast Earthing Switch**

- **Rated voltage (rms)**
  - 40.5 kV on request
- **Rated short-circuit making current kA**
  - 220 130 (165) 104 104
- **Rated peak withstand current kA**
  - 220 130 (165) 104 104
- **Rated lightning impulse withstand voltage (peak) kV**
  - 12 95 150 170
- **Rated power frequency withstand voltage (rms) kV**
  - 5 42 60 70
- **Closing time ms**
  - < 1.5
- **Number of closing operations**
  - 1
- **Service life expectation**
  - Micro gas generator years up to 15
- **Micro gas generator**
  - 40.5 kV on request

**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
- Dramatically reduced repair costs – by minimizing the effects of faults on the system
- Minimization of pressure relief measures – by application of active protection concepts

**Avoidance of the severe effects of an arc fault, such as:**

- Intensive light / high acoustic stress
- Release of particles and hot gases
- Burning / vaporization of metal and insulating material
- Temperature rise up to 20,000 °C
- Extreme pressure
- Drastically reduced repair costs
- Highly increased operator safety for switchgear
- Highly increased system and process availability

**UFES protection zone**

- **Primary switching element type U1**
- **Rated voltage (rms)**
  - 40.5 kV on request
- **Rated short-circuit making current kA**
  - 220 130 (165) 104 104
- **Rated peak withstand current kA**
  - 220 130 (165) 104 104
- **Rated lightning impulse withstand voltage (peak) kV**
  - 12 95 150 170
- **Rated power frequency withstand voltage (rms) kV**
  - 5 42 60 70
- **Closing time ms**
  - < 1.5
- **Number of closing operations**
  - 1
- **Service life expectation**
  - Micro gas generator years up to 15
- **Micro gas generator**
  - 40.5 kV on request
The active arc fault protection device for switchgear

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. An active arc fault protection system based on the know-how gained from decades of experience with the ABB vacuum circuit breaker and I-gard 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 switching time of the primary switching element for one phase.

Avoidance of the severe effects of an arc fault, such as:

- 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 relief measures – by application of active protection concepts

Unbeatable advantages:

- Intensive light / high acoustic stress
- Release of particles and hot gases
- Burning / vaporization of metal and insulating material
- Temperature rise up to 20,000 °C

- Minimization of pressure relief measures – by application of active protection concepts

The active arc fault protection device for switchgear ensures that an arc fault is extinguished almost immediately after it arises. With a total extinguishing time of less than 1.5 ms, in conjunction with the rapid and reliable detection 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 it arises.

Selection of retrofit solutions:

Particularly for older, non-VAC 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

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 ZS1 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

Applications:

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

UFES Ultra-Fast Earthing Switch

The Ultra-Fast Earthing Switch Switchgear System with an internal arc fault current of 150 kA (peak) / 50 kA (rms). 2 Primary switching elements for one phase.
UFES
Active protection for switchgear

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
- DIP switch configuration
- Ideal for extension of existing ABB arc protection systems
- Alternative: Fault detection by non-ABB system (Compatibility verification required)

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
- DIP switch configuration
- Fast fault localization

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

Note:
We reserve the right to make technical changes or modify the contents of this document without prior notice. With regard to purchase orders, the agreed particulars shall prevail. ABB AG does not accept any responsibility whatsoever for potential errors or possible lack of information in this document. We reserve all rights in this document and in the subject matter and illustrations contained herein. Any reproduction, disclosure to third parties or utilization of its contents – in whole or in parts – is forbidden without prior written consent of ABB AG.

Copyright© 2015 ABB
All rights reserved

ABB AG
Ulmstrasse 23
40472 Ratingen, Germany
Phone: +49 2102 12-0
Fax: +49 2102 12-17 77
www.abb.com/mediumvoltage
UFES
Active protection for switchgear

Note:
We reserve the right to make technical changes and reserves the content of this document without prior notice. With regard to purchase orders, we refer to the confirmed individual order agreements. ABB AG does not accept any responsibility whatsoever for potential errors or possible loss of information in this document.
We reserve all rights in this document and in the subject matter and illustrations contained therein. Any reproduction, disclosure to third parties or utilization of its contents – in whole or in parts – is forbidden without prior written consent of ABB AG.

UFES™ –
Ultra-Fast Earthing Switch

ABB AG
Ufhusenauer Straße 20
40472 Ratingen, Germany
Phone: +49 2102 12-0
Fax: +49 2102 12-17 77
www.abb.com/mediumvoltage

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
- DIP 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
- 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
- DIP switch configuration
- Fast fault localization

UFES™ –
Ultra-Fast Earthing Switch