

# Ultra-Fast Earthing Switch (UFES)

## Current Threshold Setting for arc protection system with UFES + TVOC-2 + CSU-2



UFES and TVOC-2 offer reliable arc protection since many years. The combination of UFES with TVOC-2 and the new current sensing unit type CSU-2 offers state of the art, reliable arc protection adding the feature of current measurement via Rogowski coil for low and medium voltage applications.

### 1. Scope of the document

This document contains important instructions to support safety and reliability of an active arc protection system consisting of the Ultra-Fast Earthing Switch UFES in combination with the TVOC-2 arc guard and the CSU-2 current sensing unit. The CSU-2 current sensing unit as an additional unit of the TVOC-2 arc guard takes care for the current detection by means of current sensors. The relevant instructions below focus on the setting of the current threshold level of the CSU-2 current sensing unit.

This document does not guide through a full arc protection concept engineering process. It is furthermore assumed that the single products are known in its function and application.

For more detailed information on the mentioned products please find the dedicated documentation on the ABB websites or get in contact with your local ABB office.

### 2. Current threshold setting of the CSU-2 current sensing unit

If a CSU-2 current sensing unit is used in combination with the Ultra-Fast Earthing Switch UFES the following conditions C1 to C4 must be strictly fulfilled in order to...

- a. ...meet the requirement of a 4 ms operating time of UFES
- b. ...avoid faulty current detection leading to an unintended, delayed or missing tripping operation

#### Conditions

- C1. Minimum applicable threshold setting:  
Maximum operational current  $I_{r\max} \times 1.5$
- C2. Maximum applicable threshold setting:  
Minimum short-circuit current  $I_{k\min} \div 1.5$
- C3. Minimum allowed threshold setting:  
**500 A<sub>rms</sub>**
- C4. Due to reaction time, not more than 1 additional CSU-2 unit should be wired in series. The total number of CSU-2 units per TVOC-2 unit is 4.

## 2.1 Limits based on the minimum allowed threshold setting of 500 Arms

Minimum short-circuit current $I_{k\ min.}$ (Impedance of arcing voltage included)	750 A <sub>rms</sub>
Threshold setting $I_{\ threshold}$	500 A <sub>rms</sub>
Maximum operational current $I_{r\ max.}$	333 A <sub>rms</sub>

## 2.2 Determination of a permitted threshold setting zone based on exemplary system ratings

Min. short-circuit current (arc fault current) $I_{k\ min.}$	10.000 A <sub>rms</sub>
Max. operational current $I_{r\ max.}$	2.000 A <sub>rms</sub>

$$I_{\ threshold\ max.} = I_{k\ min.} \div 1.5 = \mathbf{6.666\ A_{rms}}$$

$$I_{\ threshold\ min.} = I_{r\ max.} \times 1.5 = \mathbf{3.000\ A_{rms}}$$

Minimum short-circuit current $I_{k\ min.}$ (Impedance of arcing voltage included)	10.000 A <sub>rms</sub>
Threshold setting range $3.000\ A_{rms} \leq I_{\ threshold} \leq 6.666\ A_{rms}$	
Maximum operational current $I_{r\ max.}$	2.000 A <sub>rms</sub>

**The above-mentioned setting instruction for the combination with UFES is valid independent of the accuracies or reaction times stated in the dedicated documentation of the TVOC-2 or CSU-2!**