

Features

- Fast operation for distance protection blocking
- Fuse failure detection from MCB auxiliary contact
- Fuse failure detection based on zero sequence checking algorithm for directly or low impedance earthed systems
- Fuse failure detection based on negative sequence checking algorithm for high impedance earthed systems
- Optional automatic three phase fuse failure detection based on delta current and delta voltage check algorithm for VT switching during station operations
- Fuse failure detection latched in non volatile memory and automatic retrieving at terminal power-up

Application

The fuse failure supervision, FUSE, continuously supervises the ac voltage circuits between the voltage instrument transformers and the terminal. Different output signals can be used to block, in case of faults in the ac voltage secondary circuits, the operation of the distance protection and other voltage-dependent functions, such as the synchro-check function, undervoltage protection, etc.

Fuse failure supervision can be ordered either in zero sequence principle or in negative sequence measurement principle.

An additional criterion -based on delta current and delta voltage measurements- can be ordered and implemented within the FUSE function block in order to detect a three-phase fuse failure; which is more in practice associated to voltage transformers switching during station operations.

The FUSE function based on zero sequence measurement principle, is recommended in directly or low impedance earthed systems.

The FUSE function based on the negative sequence measurement principle is recommended in isolated or high impedance earthed systems.

Functionality

The function continuously measures the voltage and current in three-phase ac circuits. It operates if the measured zero and/or negative-sequence voltage increases over the preset operating value, and if the measured zero and/or negative-sequence current remains below the preset operating value.

The additional criterion, delta current and delta voltage algorithm, detects a three-phase fuse failure if a sufficient negative variation in voltage amplitude without a similar sufficient negative variation in current amplitude is detected in each phase. This check is performed if the circuit breaker is closed, thanks

to the information brought to the function input CBCLOSED through a binary input of the terminal.

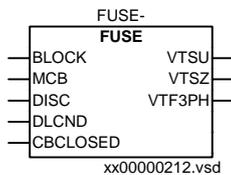
Three output signals are available. The first depends directly on the voltage and current measurement. The second depends on the operation of the dead line detection function, to prevent unwanted operation of the distance protection if the line has been deenergised and energised under fuse failure conditions. The third depends on the loss of all three measured voltages. A special function input serves the connection to the auxiliary contact of a miniature circuit breaker, MCB (if used), to secure correct operation of the function on

simultaneous interruption of all three measured phase voltages also when the additional delta current and delta voltage algorithm is not present in the function block.

The FUSE function based on the zero sequence measurement principle continuously measures the zero sequence current and voltage in all three phases. It operates if the measured zero sequence voltage increases over preset operating value, and if the measured zero sequence current remains below the preset operating value.

The FUSE function based on the negative sequence measurement principle continuously measures the negative sequence voltage and current in all three phases. It operates if the measured negative sequence voltage increases over the preset operating value, and if the measured negative sequence current remains below the preset operating value.

Function block



Input and output signals

Table 1: Input signals for the FUSE (FUSE-) function block

Signal	Description
BLOCK	Block of fuse failure function
MCB	Operation of MCB
DISC	Line disconnector position
DLCND	Dead line condition
CBCLOSED	Circuit breaker closed information

Table 2: Output signals for the FUSE (FUSE-) function block

Signal	Description
VTSU	Block for voltage measuring functions
VTSZ	Block for impedance measuring functions
VTF3PH	Detection of 3-phase fuse failure

Technical data

Table 3: FUSE - Fuse failure supervision function

Function		Setting range	Accuracy
Negative-sequence quantities:	Operate voltage $3U_2$	(10 - 50)% of U_r in steps of 1%	+/- 2.5 % of U_r
	Operate current $3I_2$	(10 - 50)% of I_r in steps of 1%	+/- 2.5 % of I_r

Table 4: FUSE - Fuse failure supervision function

Function		Setting range	Accuracy
Zero-sequence quantities:	Operate voltage $3U_0$	(10-50)% of U_r in steps of 1%	+/- 2.5 % of U_r
	Operate current $3I_0$	(10-50)% of I_r in steps of 1%	+/- 2.5 % of I_r

Table 5: Fuse failure supervision function (optional)

Function	Setting range	Accuracy
Operate voltage change level	(50-90)% of U_r in steps of 1%	+/-2.5% of U_r
Operate current change level	(10-50)% of I_r in steps of 1%	+/- 2.5% of I_r

Manufacturer

ABB Automation Products AB

Substation Automation Division

SE-721 59 Västerås

Sweden

Tel: +46 (0) 21 34 20 00

Fax: +46 (0) 21 14 69 18