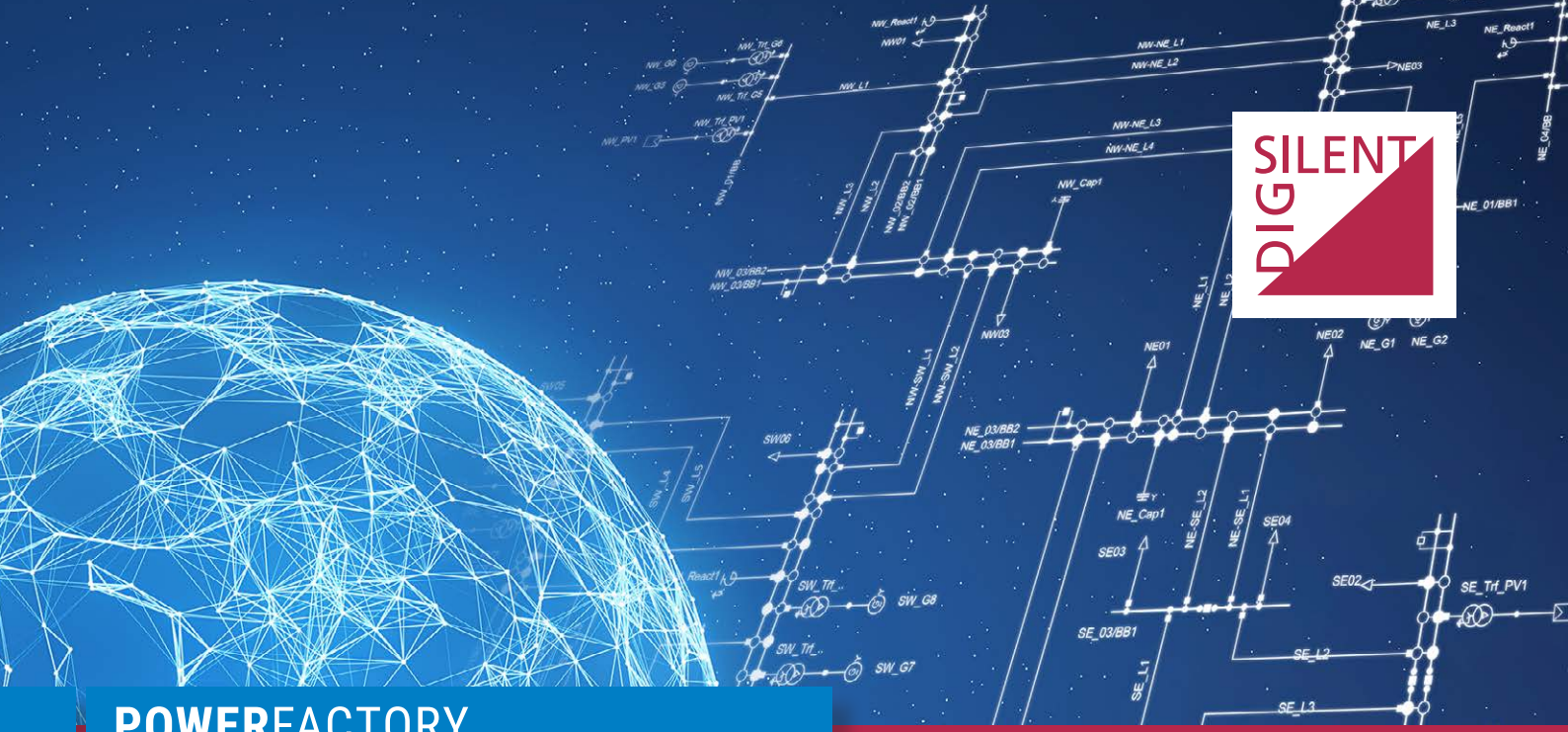

PowerFactory 2021

Technical Reference

Areva P44x

PF2021

POWER SYSTEM SOLUTIONS

MADE IN GERMANY

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Contents

1 Model information

Manufacturer Areva

Model P44x

Variants The Areva P44x PowerFactory relay model can be used to simulate the Areva P443, P445, and P446 relay. However please consider that the model has been implemented with a reduced set of the features available in the relays.

2 General description

The Areva P44x line distance protection device is a protective relay designed to provide fast highly selective line protection. It can be applied in all kind of medium, high and extra high voltage systems. The wide range of protection functions covers all kind of applications in cable and overhead line protection.

The Areva P44x PowerFactory relay model consists of a monolithic model scheme.

The Areva P44x PowerFactory relay model has been implemented trying to simulate the most commonly used protective functions.

The relay model contains the measurement and acquisition units, the starting element, the polarizing elements, the directional element for the distance elements, the reclosing element, the polygonal and the mho distance elements, a set of timers, the output logic.

The model implementation has been based on the information available in the relay manual [1] [2].

3 Supported features

3.1 Measurement and acquisition

The voltage and the current are measured by one three phase current transformer (”Ct” block) and one three phase voltage transformer (”Vt” block).

Three measurement units (”Measurement”, ”Delta Measure” and ”Measure Seq” block) are fed by this CT and this VT.

3.1.1 Available Units

- One three phase current transformers (”Ct” block).
- One three phase voltage transformer (”Vt” block).
- One three phase measurement element calculating both the current and voltage values (”Measurement” block).

- One three phase measurement element calculating the phase to phase currents and the phase to phase voltages (”Delta Measure” block).
- One three phase measurement element calculating the current and the voltage sequence vectors (”Measurement Seq” block).

3.1.2 Functionality

The input current and voltage values are sampled at 48 samples/cycle. The average values are processed by a DFT filter, operating over a cycle, which then calculates the voltage and current values used by the protective elements.

The ”Delta Measure” block calculates the current and voltage ph-ph values used by the phase-phase loop distance elements.

3.1.3 Data input

The nominal current and the nominal voltage values MUST be entered in all the measurement blocks.

3.2 Main Relay protective elements

The starting element, the polarizing element,the directional element, the polygonal and the mho distance elements are working together to simulate the Areva P44x distance functionalities. The ancillary overcurrent and voltage protective elements are also located here.

3.2.1 Available Units

- One starting unit implementing the fault detection logic minimum current threshold(”Starting” block).
- One directional element (”Dir-Z” block).
- Four polarizing blocks (”Polarizing Z1”, ”Polarizing Z2”, ”Polarizing Z3-Z4” and ”Polarizing ZP” block).
- Five phase minimum operating current elements (”Z1 Sensit Iph>1” , ”Z2 Sensit Iph>2”, ”Z3 Sensit Iph>3”, ”ZP Sensit Iph>P” and ”Z4 Sensit Iph>4” block)
- Six phase polygonal distance elements (”Z1 Ph”, ”Z2 Ph”, ”Z3 Ph”, ”Z4 Ph” , ”Z1X Ph” and ”ZP Ph” block).
- Six phase mho distance elements (”Z1 Ph Mho”, ”Z2 Ph Mho”, ”Z3 Ph Mho”, ”Z4 Ph Mho” , ”Z1X Ph Mho” and ”ZP Ph Mho” block).
- Five ground minimum operating current elements (”Z1 Sensit Igrnd>1” , ”Z2 Sensit Igrnd>2”, ”Z3 Sensit Igrnd>3”, ”ZP Sensit Igrnd>P” and ”Z4 Sensit Igrnd>4” block)
- Six ground polygonal distance elements (”Z1 Grnd”, ”Z2 Grnd”, ”Z3 Grnd”, ”Z4 Grnd” , ”Z1X Grnd” and ”ZP Grnd” block).
- Six ground mho distance elements (”Z1 Grnd Mho”, ”Z2 Grnd Mho”, ”Z3 Grnd Mho”, ”Z4 Grnd Mho” , ”Z1X Grnd Mho” and ”ZP Grnd Mho” block).
- Five timers (”ZT1”, ”ZT2”, ”ZT3”, ”ZT4” and ”ZTP” block).
- One reclosing element (”Reclosing” block).
- Two definite time 3 phase overvoltage elements (”V> 1” and ”V> 2” block).
- Two definite time 3 phase undervoltage elements (”V< 1” and ”V< 2” block).
- Two inverse time 3 phase overcurrent elements (”I> 1” and ”I> 2” block).
- Two definite time 3 phase overcurrent elements (”I> 3” and ”I> 4” block).
- One directional definite time negative sequence overcurrent element (”I2>” block).
- One negative sequence directional element (”Neg seq Dir” block).
- Two directional inverse time residual overcurrent elements (”IN> 1” and ”IN> 2” block).
- One residual directional element (”Earth Dir” block).

3.2.2 Functionality

Directional element The directional element (”Dir-Z” block) is controlling both the phase-phase and the phase-ground loops. The directional angles are fixed and the element is modeling in detail the behavior of the relay directional function.

Polarizing element The polarizing element is calculating the voltage vectors used by the directional element.

Polygonal impedance elements The polygonal impedance elements implement a quadrilateral shape with different impedance and resistance reaches for the phase-phase and the phase-ground loops. The elements get the phase-phase and the phase-ground loop impedance values from the *Polarizing* block and check that the impedance point is inside the quadrilaterals; in that case they activate the output signal after that time delay provided by the associated timer is expired. An additional polygonal element ("Z1X" block) can be used to stored the impedance settings used to implement a zone extension protection scheme.

Mho elements Separated mho elements are monitoring the phase-ground and the phase-phase loops. The 3^{rd} zone mho can be configured as offset mho.

Timers The timers start counting the time as soon that a fault has been detected by the *Starting* element ("ystart" output signal). Five timers ("ZT1", "ZT2", "ZT3", "ZT4" and "ZTP") are associated to the mho and to the polygonal elements. The "ZT1" timer is associated both the 1^{st} zone element and to the element that can be used to simulate the extension zone feature ("Z1X" block).

Recloser The reclosing element can be set to trigger a variable number of reclosing attempts. Different dead times can be set for the first reclosing attempt (high speed reclosing) and for each following attempt. A independent dead time after the trip can be set to be used when single phase ground fault has been detected. If the high speed reclosing is not used the dead times must be set identical and equal to time delay reclosing dead time. .

Overcurrent The inverse time elements are supporting the following inverse time and definite time trip characteristics :

- Definite Time
- IEC Standard inverse
- IEC Very inverse
- IEC Extremely inverse
- IEEE Moderately inverse
- IEEE Very inverse
- IEEE Extremely inverse
- UK Long time inverse
- US CO8 Inverse
- US CO2 Short Time inverse

The inverse time element trip characteristic equations comply with the IEC 60255-3 and the ANSI standards.

3.2.3 Data input

The relationships between the relay settings and the model parameters can be found in the following tables (the relay model parameter names are listed between brackets):

Directional element :

No user input is required.

Polarizing element :

Address	Relay Setting	Model block	Model setting	Note
	kZN1 Res. Comp.	Polarizing Z1	k0 (k0)	
	kZN1 Res. Angle	Polarizing Z1	Angle (phik0)	
	kZN2 Res. Comp.	Polarizing Z2	k0 (k0)	
	kZN2 Res. Angle	Polarizing Z2	Angle (phik0)	
	kZN3 Res. Comp.	Polarizing Z3	k0 (k0)	
	kZN3 Res. Angle	Polarizing Z3	Angle (phik0)	
	kZN4 Res. Comp.	Polarizing Z4	k0 (k0)	
	kZN4 Res. Angle	Polarizing Z4	Angle (phik0)	
	kZNP Res. Comp.	Polarizing ZP	k0 (k0)	
	kZNP Res. Angle	Polarizing ZP	Angle (phik0)	

Polygonal impedance elements :

Address	Relay Setting	Model block	Model setting	Note
	Z1 Ph Status	Z1 Ph	Out of Service (outserv)	
	Z1 Ph. Reach	Z1 Ph	Z Reach (Zmax)	
	Z1 Ph. Angle	Z1 Ph	Relay Angle (phi)	
	R1 Ph. Resistive	Z1 Ph	+R Resistance (Rmax)	
	Z1 Tilt Top Line	Z1 Ph	+X Angle (beta)	
	Z1 Sensit. Iph>1	Z1 Sensit Iph>1	Pickup Current (Ipset)	
	Z2 Ph Status	Z2 Ph	Out of Service (outserv)	
	Z2 Ph. Reach	Z2 Ph	Z Reach (Zmax)	
	Z2 Ph. Angle	Z2 Ph	Relay Angle (phi)	
	R2 Ph. Resistive	Z2 Ph	+R Resistance (Rmax)	
	Z2 Tilt Top Line	Z2 Ph	+X Angle (beta)	
	Z2 Sensit. Iph>2	Z2 Sensit Iph>2	Pickup Current (Ipset)	
	Z3 Ph Status	Z3 Ph	Out of Service (outserv)	
	Z3 Ph. Reach	Z3 Ph	Z Reach (Zmax)	
	Z3 Ph Rev Reach	Z3 Ph	Z Reach (Zmax)	The Z fwd and rev reach are unique in the model
	Z3 Ph. Angle	Z3 Ph	Relay Angle (phi)	

Address	Relay Setting	Model block	Model setting	Note
	R3 Ph. Res Fwd.	Z3 Ph	+R Resistance (Rmax)	
	R3 Ph. Res Rev.	Z3 Ph	-R Resistance (Rmin)	
	Z3 Tilt Top Line	Z3 Ph	+X Angle (beta)	
	Z3 Sensit. Iph>3	Z3 Sensit Iph>3	Pickup Current (Ipset)	
	ZP Ph Status	ZP Ph	Out of Service (outserv)	
	ZP Ph. Dir.	ZP Ph	Tripping Direction (idir)	
	ZP Ph. Reach	ZP Ph	Z Reach (Zmax)	
	ZP Ph. Angle	ZP Ph	Relay Angle (phi)	
	RP Ph. Resistive	ZP Ph	+R Resistance (Rmax)	
	ZP Tilt Top Line	ZP Ph	+X Angle (beta)	
	ZP Sensit. Iph>P	ZP Sensit Iph>P	Pickup Current (Ipset)	
	Z4 Ph Status	Z4 Ph	Out of Service (outserv)	
	Z4 Ph. Reach	Z4 Ph	Z Reach (Zmax)	
	Z4 Ph. Angle	Z4 Ph	Relay Angle (phi)	
	R4 Ph. Resistive	Z4 Ph	+R Resistance (Rmax)	
	Z4 Tilt Top Line	Z4 Ph	+X Angle (beta)	
	Z4 Sensit. Iph>4	Z4 Sensit Iph>2	Pickup Current (Ipset)	
	Z1 Gnd Status	Z1 Grnd	Out of Service (outserv)	
	Z1 Gnd. Reach	Z1 Grnd	Z Reach (Zmax)	
	Z1 Gnd. Angle	Z1 Grnd	Relay Angle (phi)	
	R1 Gnd. Resistive	Z1 Grnd	+R Resistance (Rmax)	
	Z1 Tilt Top Line	Z1 Grnd	+X Angle (beta)	
	Z1 Sensit. Ignd>1	Z1 Sensit IGrnd>1	Pickup Current (Ipset)	
	Z2 Gnd Status	Z2 Grnd	Out of Service (outserv)	
	Z2 Gnd. Reach	Z2 Grnd	Z Reach (Zmax)	
	Z2 Gnd. Angle	Z2 Grnd	Relay Angle (phi)	
	R2 Gnd. Resistive	Z2 Grnd	+R Resistance (Rmax)	
	Z2 Tilt Top Line	Z2 Grnd	+X Angle (beta)	
	Z2 Sensit. Ignd>2	Z2 Sensit IGrnd>2	Pickup Current (Ipset)	
	Z3 Gnd Status	Z3 Grnd	Out of Service (outserv)	
	Z3 Gnd. Reach	Z3 Grnd	Z Reach (Zmax)	
	Z3 Gnd. Rev Reach	Z3 Grnd	Z Reach (Zmax)	The Z fwd and rev reach are unique in the model
	Z3 Gnd. Angle	Z3 Grnd	Relay Angle (phi)	
	R3 Gnd. Res Fwd.	Z3 Grnd	+R Resistance (Rmax)	
	R3 Gnd. Res Rev.	Z3 Grnd	-R Resistance (Rmin)	
	Z3 Tilt Top Line	Z3 Grnd	+X Angle (beta)	
	Z3 Sensit. Iph>3	Z3 Sensit Igrnd>3	Pickup Current (Ipset)	
	ZP Gnd Status	ZP Grnd	Out of Service (outserv)	
	ZP Gnd Dir.	ZP Grnd	Tripping Direction (idir)	
	ZP Gnd. Reach	ZP Grnd	Z Reach (Zmax)	
	ZP Gnd. Angle	ZP Grnd	Relay Angle (phi)	
	RP Gnd. Resistive	ZP Grnd	+R Resistance (Rmax)	
	ZP Tilt Top Line	ZP Grnd	+X Angle (beta)	
	ZP Sensit. Ignd>P	ZP Sensit Igrnd>P	Pickup Current (Ipset)	
	Z4 Gnd Status	Z4 Grnd	Out of Service (outserv)	
	Z4 Gnd. Reach	Z4 Grnd	Z Reach (Zmax)	
	Z4 Gnd. Angle	Z4 Grnd	Relay Angle (phi)	
	R4 Gnd. Resistive	Z4 Grnd	+R Resistance (Rmax)	
	Z4 Tilt Top Line	Z4 Grnd	+X Angle (beta)	

Address	Relay Setting	Model block	Model setting	Note
	Z4 Sensit. Ignd>4	Z4 Sensit Igrnd>2	Pickup Current (Ipset)	

Mho impedance elements :

Address	Relay Setting	Model block	Model setting	Note
	Z1 Ph Status	Z1 Ph Mho	Out of Service (outserv)	
	Z1 Phase Reach	Z1 Ph Mho	Z Replica Impedance (Zm)	
	Z1 Ph. Angle	Z1 Ph Mho	Relay Angle (phi)	
	Z2 Ph Status	Z2 Ph Mho	Out of Service (outserv)	
	Z2 Phase Reach	Z2 Ph Mho	Z Replica Impedance (Zm)	
	Z2 Ph. Angle	Z2 Ph Mho	Relay Angle (phi)	
	Z3 Ph Status	Z3 Ph Mho	Out of Service (outserv)	
	Z3 Phase Reach	Z3 Ph Mho	Z Replica Impedance (Zm)	
	Z3 Ph. Angle	Z3 Ph Mho	Relay Angle (phi)	
	ZP Ph Status	ZP Ph Mho	Out of Service (outserv)	
	ZP Phase Reach	ZP Ph Mho	Z Replica Impedance (Zm)	
	ZP Ph. Angle	ZP Ph Mho	Relay Angle (phi)	
	Z4 Ph Status	Z4 Ph Mho	Out of Service (outserv)	
	Z4 Phase Reach	Z4 Ph Mho	Z Replica Impedance (Zm)	
	Z4 Ph. Angle	Z4 Ph Mho	Relay Angle (phi)	
	Z1 Gnd Status	Z1 Grnd Mho	Out of Service (outserv)	
	Z1 Ground Reach	Z1 Grnd Mho	Z Replica Impedance (Zm)	
	Z1 Gnd. Angle	Z1 Grnd Mho	Relay Angle (phi)	
	Z2 Gnd Status	Z2 Grnd Mho	Out of Service (outserv)	
	Z2 Ground Reach	Z2 Grnd Mho	Z Replica Impedance (Zm)	
	Z2 Gnd. Angle	Z2 Grnd Mho	Relay Angle (phi)	
	Z3 Gnd Status	Z3 Grnd Mho	Out of Service (outserv)	
	Z3 Ground Reach	Z3 Grnd Mho	Z Replica Impedance (Zm)	
	Z3 Gnd. Angle	Z3 Grnd Mho	Relay Angle (phi)	
	ZP Gnd Status	ZP Grnd Mho	Out of Service (outserv)	
	ZP Ground Reach	ZP Grnd Mho	Z Replica Impedance (Zm)	
	ZP Gnd. Angle	ZP Grnd Mho	Relay Angle (phi)	
	Z4 Gnd Status	Z4 Grnd Mho	Out of Service (outserv)	
	Z4 Ground Reach	Z4 Grnd Mho	Z Replica Impedance (Zm)	
	Z4 Gnd. Angle	Z4 Grnd Mho	Relay Angle (phi)	

Timers :

Address	Relay Setting	Model block	Model setting	Note
	tZ1 Ph. Delay	ZT1	Time Setting (Tdelay)	
	tZ1 Gnd. Delay	ZT1	Time Setting (Tdelay)	
	tZ2 Ph. Delay	ZT2	Time Setting (Tdelay)	
	tZ2 Gnd. Delay	ZT2	Time Setting (Tdelay)	
	tZ3 Ph. Delay	ZT3	Time Setting (Tdelay)	
	tZ3 Gnd. Delay	ZT3	Time Setting (Tdelay)	
	tZP Ph. Delay	ZTP	Time Setting (Tdelay)	
	tZP Gnd. Delay	ZTP	Time Setting (Tdelay)	
	tZ4 Ph. Delay	ZT4	Time Setting (Tdelay)	
	tZ4 Gnd. Delay	ZT4	Time Setting (Tdelay)	

Recloser :

Address	Relay Setting	Model block	Model setting	Note
	Single Pole Shot	Reclosing	Operation mode	In the ”Operation Mode” tab page select ”1-pole auto reclosing for 1 phase and 3 pole auto reclosing for multi-phase faults” when the ”Trip Mode” is ”1 and 3 pole", select ”3 pole auto reclosing for multi-phase faults” when the ”Trip Mode" is ”3 pole”
	3 Pole Shot	Reclosing	Operations to lockout (oplockout)	In the ”Basic Data” tab page
	1 Pole Dead Time	Reclosing	Reclosing int 1 1Ph-Grnd faults (recltime1 1ph)	In the ”Basic Data” tab page
	Dead Time 1	Reclosing	Reclosing Interval 1 (recltime1)	In the ”Basic Data” tab page
	Dead Time 2	Reclosing	Reclosing Interval 2 (recltime2)	In the ”Basic Data” tab page
	Dead Time 3	Reclosing	Reclosing Interval 3 (recltime3)	In the ”Basic Data” tab page
	Dead Time 4	Reclosing	Reclosing Interval 4 (recltime4)	In the ”Basic Data” tab page
	Reclaim Time	Reclosing	Reset Time (resettime)	In the ”Basic Data” tab page

Overcurrent :

The relationships between the relay settings and the model parameters can be found in the following table:

Address	Relay Setting	Model block	Model setting	Note
	I> 1 Status	I> 1	Out of Service (outserv)	
	I> 1 Function	I> 1	Characteristic (pcharac)	
	I> 1 Current Set	I> 1	Current setting (Ipset)	
	I> 1 Time Delay	I> 1	Time Dial (Tpset)	Used in the relay by the DT characteristic
	I> 1 TMS	I> 1	Time Dial (Tpset)	Used in the relay by the IEC characteristics
	I> 1 Time Dial	I> 1	Time Dial (Tpset)	Used in the relay by the IEEE/US characteristic
	I> 2 Status	I> 2	Out of Service (outserv)	
	I> 2 Function	I> 2	Characteristic (pcharac)	
	I> 2 Current Set	I> 2	Current setting (Ipset)	
	I> 2 Time Delay	I> 2	Time Dial (Tpset)	Used in the relay by the DT characteristic
	I> 2 TMS	I> 2	Time Dial (Tpset)	Used in the relay by the IEC characteristics

Address	Relay Setting	Model block	Model setting	Note
	I> 2 Time Dial	I> 2	Time Dial (Tpset)	Used in the relay by the IEEE/US characteristic
	I> 3 Status	I> 3	Out of Service (outserv)	
	I> 3 Current Set	I> 3	Pickup Current (Ipset)	
	I> 3 Time Delay	I> 3	Time Setting (Tset)	
	I> 4 Status	I> 4	Out of Service (outserv)	
	I> 4 Current Set	I> 4	Pickup Current (Ipset)	
	I> 4 Time Delay	I> 4	Time Setting (Tset)	
	IN> 1 Status	IN> 1	Out of Service (outserv)	
	IN> 1 Function	IN> 1	Characteristic (pcharac)	
	IN> 1 Directional	IN> 1	Tripping Direction (idir)	
	IN> 1 Current Set	IN> 1	Current setting (Ipset)	
	IN> 1 Time Delay	IN> 1	Time Dial (Tpset)	Used in the relay by the DT characteristic
	IN> 1 TMS	IN> 1	Time Dial (Tpset)	Used in the relay by the IEC characteristics
	IN> 1 Time Dial	IN> 1	Time Dial (Tpset)	Used in the relay by the IEEE/US characteristic
	IN> 2 Status	IN> 2	Out of Service (outserv)	
	IN> 2 Function	IN> 2	Characteristic (pcharac)	
	IN> 2 Directional	IN> 2	Tripping Direction (idir)	
	IN> 2 Current Set	IN> 2	Current setting (Ipset)	
	IN> 2 Time Delay	IN> 2	Time Dial (Tpset)	Used in the relay by the DT characteristic
	IN> 2 TMS	IN> 2	Time Dial (Tpset)	Used in the relay by the IEC characteristics
	IN> 2 Time Dial	IN> 2	Time Dial (Tpset)	Used in the relay by the IEEE/US characteristic
	IN> 2 tRESET	IN> 2	Reset Delay (ResetT)	Activate the reset feature with the ”Reset Characteristic” check box
	IN> Char Angle	Dir IN Io-Vo	Max. Torque Angle (mtau)	in the *Voltage Polarizing* tab page
	IN> Polarisation	Dir IN Io-Vo	Out of Service (outserv)	disable when the relay setting is ”negative sequence”
	IN> VNpol Set	Dir IN Io-Vo	Polarizing Voltage (upolur)	in the *Voltage Polarizing* tab page
	I2> Status	I2>	Out of Service (outserv)	
	I2> Directional	I2>	Tripping Direction (idir)	
	I2> Current Set	I2>	Pickup Current (Ipset)	
	I2> Time Delay	I2>	Time Setting (Tset)	
	I2> Char Angle	Dir I2	Max. Torque Angle (mtau)	in the *Voltage Polarizing* tab page
	I2> V2pol Set	Dir I2	Polarizing Voltage (upolur)	in the *Voltage Polarizing* tab page

Voltage :

The relationships between the relay settings and the model parameters can be found in the following table:

Address	Relay Setting	Model block	Model setting	Note
	V< Operate Mode	V< 1	Out of Service (outserv)	
	V< 1 Function	V< 1	Characteristic (pcharac)	
	V< 1 Voltage Set	V< 1	Input Setting (Ipsetr)	
	V< 1 Time Delay	V< 1	Time Dial (Tpset)	
	V< 2 Status	V< 2	Out of Service (outserv)	
	V< 2 Voltage Set	V< 2	Pickup Voltage (Usetr)	
	V< 2 Time Delay	V< 2	Time Delay (tdel)	
	V> 2 Operate Mode	V> 1	Out of Service (outserv)	
	V> 1 Function	V> 1	Characteristic (pcharac)	

Address	Relay Setting	Model block	Model setting	Note
	V> 1 Voltage Set	V> 1	Input Setting (Ipsetr)	
	V> 1 Time Delay	V> 1	Time Dial (Tpset)	
	V> 2 Status	V> 2	Out of Service (outserv)	
	V> 2 Voltage Set	V> 2	Pickup Voltage (Usetr)	
	V> 2 Time Delay	V> 2	Time Delay (tdel)	

3.3 Output logic

The output logic is the interface between the relay and the power system. A set of relay output signals can be used to simulate the control logics.

3.3.1 Available Units and Signals

The trip and reclosing logic is implemented by the following block located in the main relay.

- Phase Logic
- Ground Logic
- Additional Logic
- Closing Logic

The relay output signals are:

- youtph (coming from the ”Phase Logic” block)
- youtgrnd (coming from the ”Ground Logic” block)
- youtadd (coming from the ”Additional Logic” block)
- youtclose (coming from the ”Closing Logic” block)

The ”yExt” relay input signal is available also and can be used to implement accelerated trip schemes.

3.3.2 Functionality

The ”Phase Logic”, the ”Ground Logic” and the ”Additional Logic” block has the task to operate the power breaker when a trip command has been issued by any protective element. The ”Phase logic” block gets the phase polygonal and the phase mho elements trip signals; the ”Ground logic” block gets the ground polygonal and the ground mho elements trip signals; the ”Additional Logic” block gets the overcurrent and the voltage elements trip signals. These blocks use to operate the breaker the ”yout”output signal. The ”Phase Logic” can be configures to support a *PUTT* accelerated trip scheme for the phase faults. The ”Phase Logic”, the ”Ground Logic” and the ”Additional Logic” block implement a three phases trip logic.

The ”Closing Logic” block controlled by the reclosing feature (”Reclosing” block) has the purpose of generating a closing command for the power breaker when a reclosing attempt is triggered.

3.3.3 Data input

Please disable the ”Phase Logic”, the ”Ground Logic” and the ”Additional Logic” block in the main relay to disable the relay model ability to open the power circuit.

Set equal to ’TRIP” the ’PUTT” variable in the ”Logic” tab page of the ”Phase Logic” dialog to enable the *PUTT* accelerated trip logic for the phase faults.

4 Features not supported

4.1 Main features

The following features are not supported:

- Phase directional logic.
- Mutual compensation.
- Variable self polarized and memory polarized voltage
- Fault detection superimposed current method
- Broken conductor detection.
- Channel aided DEF.
- Circuit breaker failure.
- Voltage transformer supervision.
- Current transformer supervision.
- Power swing detector.
- Out of step trip.
- Load blinder.
- Check synchronisation.
- Single phase tripping.

5 References

[1] Alstom T&D, Automation & Information Systems Business, Tour AREVA 1, place Jean Millier 92084 Paris - La Défense, 92084 France. *MiCOMho Alstom P443, P445 & P446 High performance distance protection GRID-SAS-L3-P44y-2485-2012_04-EN*, 2012.

[2] Areva T&D, Automation & Information Systems Business, Tour AREVA 1, place Jean Millier 92084 Paris - La Défense, 92084 France. *MiCOMho P443, P445 Technical Manual Fast Multifunction Distance Protection Relays Platform Hardware Version: J Platform Software Version: 33 Publication Reference: P44y/EN M/C21*, 2011.