PowerFactory 2021

Technical Reference

Areva P12x

PF2021

Contents

1   Model information

Manufacturer   Areva

Model   P12x

Variants   This PowerFactory relay models simulate a reduced set of the features present in the Areva MiCOM P120, P121, P122, P123 (firmware version 11), P125, P126, and P127 relays (firmware version V6.F).

2   General description

The overcurrent relays of the MiCOM P120 range are AREVA T&D universal overcurrent relays. MiCOM P120, P121, P122 and P123 relays have been designed to control, protect and monitor industrial installations, public distribution networks and substations, and to be used as back-up protection for EHV and HV transmission networks.

The MiCOM P125, P126, and P127 relays have been designed for controlling, protecting and monitoring industrial installations, public distribution networks and substations. They can also be used as part of a protection scheme for transformers and generator transformers. The P125, P126, and P127 relays can also provide back-up protection for HV and EHV transmission systems.

The PowerFactory Areva P12x relay models are monolithic models and simulate a subset of the protective features available in the relays. The following four models are available:

- P120 (modeling the single phase relay MICOM P120).

- P12x (modeling the MICOM P121, P122, and P123 relays).

- P127 57-130V (modeling the MICOM P125, P126, and P127 relays with the 57-130V input voltage range).

- P127 220-480V (modeling the MICOM P125, P126, and P127 relays with the 220-480V input voltage range)).

Please notice that the *P127 57-130V* and the *P127 220-480V* relay model are identical except that for the voltage element threshold ranges.

The model implementation has been based on the information available in the relay technical brochure and manual [1] [2] [3] [4] [5].

3   Supported features

3.1   Measurement and acquisition

It represents the interface between the power system and the relay protective elements.

P120   A single current is converted by a single phase CT; the secondary current is then measured in the relay model by one element which simulates the digital sampling of the relay.

P12x   The phase currents flowing in the power system are converted by a block which simulates the 3 phase CT and by a block which models a single phase CT detecting the earth current; the secondary currents are then measured in the relay model by two elements which simulate the digital sampling of the relay.

P127   The phase currents flowing in the power system are converted by a block which simulates the 3 phase CT and by a block which models a single phase CT detecting the earth current; the system phase voltages are converted by a block which simulates a 3phase VT; the secondary currents and voltages are then measured in the relay model by two elements which simulate the digital sampling of the relay.

3.1.1   Available elements and input signals

The *Measurement and acquisition* feature consists of the following elements:

P120

- One single phase current transformer ("Ct-E/N" block).
- One single phase measurement element ("Measure Ph" block).

P12x

- One 3 phase current transformer ("Ct-3P" block).
- One neutral current transformer ("Ct-E/N" block).
- One 3 phase measurement element ("Measure Ph" block).
- One sequence measurement element ("Measure Seq" block).

P127

- One 3 phase current transformer ("Ct-3P" block).
- One 3 phase voltage transformer ("Vt" block).
- One neutral current transformer ("Ct-E/N" block).
- One 3 phase measurement element ("Measure Ph" block).
- One sequence measurement element ("Measure Seq" block).

The following relay input signals are available to block the protective elements:

P120

- *iblock inv phase* controlling *I>*
- *iblock inst1* controlling *I>>*
- *iblock inst2* controlling *I>>>*

P12x and P127

- *BlockI>* controlling *I>*
- *BlockI>>* controlling *I>>*
- *BlockI>>>* controlling *I>>>*
- *BlockIe>* controlling *Ie>*
- *BlockIe>>* controlling *Ie>>*
- *BlockIe>>>* controlling *Ie>>>*
- *iblock6* controlling *Therm* (thermal image element)
- *iblock7* controlling *Undercurrent*
- *iblock8* controlling *Broken cond* (Broken conductor feature)
- *iblock9* controlling *I2>>*
- *iblock10* controlling *I2>>>*

3.1.2   Functionality

The "Ct-3P" and the "Ct-E/N" block represent ideal CTs. Using the CT default configuration the current at the primary side are converted to the secondary side using the CT ratio. The CT saturation and/or its magnetizing characteristic are not considered. Please set the "Detailed Model" check box in the "Detailed Data" tab page of the CT dialog and insert the data regarding the CT burden, the CT secondary resistance and the CT excitation parameter if more accurate simulation results are required.

The input current and voltage values are sampled by the "Measure Ph" and the "Measure Seq" block at 20 samples/cycle. The values are processed by a DFT filter, operating over a cycle, which then calculates the voltage and current RMS values used by the protective elements.

3.1.3   Data input

The CT secondary rated current (1 or 5 A) value must be set in the "Measure Ph" and in the "Measure Seq" block.

If no core CT is available please select the 3 phases CT also in the "Ct-E/N" slot: the earth current will be calculated assuming that an Holmgreen's connection of the phases is used.

3.2   Protective elements

A set of inverse time and definite time overcurrent elements is modeling the relay protective functions. All the inverse characteristics available in the relay are available in the inverse time model blocks. The P127 relay model includes also a set of voltage protective elements.

3.2.1   Available Units

P120

- two single phase inverse time elements ("I>", "I>>" block).

- one single phase time defined element ("I>>>" block).

P12x

- Two three phase inverse time elements ("I>" and "I>>" block).

- One three phase time defined element ("I>>>" block).

- Two earth current inverse time elements ("Ie>" and "Ie>>" block).

- One earth current time defined element ("Ie>>>" block).

- One negative sequence inverse time element ("I2>" block).

- Two negative sequence time defined elements ("I2>>" and "I2>>>" block).

- One thermal element ("Therm" block).

- One undercurrent element ("Undercurrent" block).

- One broken conductor element ("Broken cond" block).

- Auto reclosing feature ("Reclosing" block).

P127

- Two directional three phase inverse time elements ("I>" and "Dir I>" block, "I>>" and "Dir I>>" block).

- One directional three phase time defined element ("I>>>" and "Dir I>>>" block).

- Two directional earth current inverse time elements ("Ie>" and "Dir Ie>", "Ie>>" and "Dir Ie>>" block).

- One directional earth current time defined element ("Ie>>>" and "Dir Ie>>>" block).

- One negative sequence inverse time element ("I2>" block).

- Two negative sequence time defined elements ("I2>>" and "I2>>>" block).

- One thermal element ("Therm" block).

- One undercurrent element ("Undercurrent" block).

- One broken conductor element ("Broken cond" block).

- Auto reclosing feature ("Reclosing" block).

- Two phase overvoltage elements ("U>" and "U>>" block).

- Four zero sequence overvoltage elements ("Ue>", "Ue>>", "Ue>>>", and "Ue>>> >" block).

- Two phase undervoltage elements ("U<" and "U<< " block).

3.2.2 Functionality

The inverse time overcurrent elements ("IrefP", "IrefN" and "IrefNeg" block) support the following trip characteristics:

- ANSI/IEEE extremely inverse

- ANSI/IEEE moderately inverse

- ANSI/IEEE very inverse

- Alstom Long time inverse

- Alstom Short time inverse

- CO2 Short time inverse

- CO8 Long time inverse

- Definite time (51)

- IEC Extremely Inverse

- IEC Standard Inverse

- IEC Very Inverse

- RI-Type inverse

- Rectifier curve

- LOBORELEC 1

- LOBORELEC 2

- LOBORELEC 3

A delayed reset characteristic is available for the "ANSI/IEEE extremely inverse", the "ANSI/IEEE moderately inverse", the "ANSI/IEEE very inverse", the "CO2 Short time inverse", and the "CO8 Long time inverse" characteristic and can be enabled or disabled by the user.

The relationship between current and time values for the "IEC Extremely Inverse", the "IEC Standard Inverse", and the "IEC Very Inverse" characteristic complies with the IEC 60255-3 standards. The "ANSI/IEEE extremely inverse", the "ANSI/IEEE moderately inverse", and the "ANSI/IEEE very inverse" characteristic complies with the ANSIIEEE C37.112 standards. The "RI-Type inverse", the "CO2 Short time inverse", and the "CO8 Long time inverse" characteristic are special characteristic which are used mainly in combination with existing mechanical relays. The "Definite time (51)" characteristic is a time constant characteristic which allow to define the DTOC relay operation mode.

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):

P120   :

Address	Relay Setting	Model block	Model setting	Note
0230	IE>	I>	Out of Service(outserv)	
0231	IE> threshold	I>	Current Setting (Ipset)	
0232	IE> time delay type	I>	Characteristic (pcharac)	the model parameter combines 0233 and 0232
0233	IE> IDMT Curve Type	I>	Characteristic (pcharac)	the model parameter combines 0233 and 0232
0234	IE> TMS value	I>	Time Dial (Tpset)	
0235	IE> K value (RI curve)	I>	Time Dial (Tpset)	only for "RI-Type inverse"
0236	tIE> value	I>	Time Dial (Tpset)	
0240	IE>>	I>>	Out of Service(outserv)	
0241	IE>> threshold	I>>	Current Setting (Ipset)	
0242	tIE>> value	I>>	Time Dial (Tpset)	
0243	IE>> time delay type	I>>	Characteristic (pcharac)	the model parameter combines 0243 and 0244
0244	IE>> IDMT Curve Type	I>>	Characteristic (pcharac)	the model parameter combines 0243 and 0244
0245	IE>> TMS value	I>>	Time Dial (Tpset)	
0246	IE>> K value (RI curve)	I>>	Time Dial (Tpset)	only for "RI-Type inverse"
0250	IE>>>	I>>>	Out of Service(outserv)	
0251	IE>>> Threshold	I>>>	Pickup Current (Ipset)	
0252	IE>>> value	I>>>	Time Setting (Tset)	

P12X   :

Address	Relay Setting	Model block	Model setting	Note
0200	I>	I>	Out of Service(outserv)	
0201	I> threshold	I>	Current Setting (Ipset)	
0202	I> time delay type	I>	Characteristic (pcharac)	the model parameter combines 0203 and 0202
0203	I> IDMT Curve Type	I>	Characteristic (pcharac)	the model parameter combines 0203 and 0202
0204	I> TMS value	I>	Time Dial (Tpset)	
0205	I> K value (RI curve)	I>	Time Dial (Tpset)	only for "RI-Type inverse"
0206	tI> value	I>	Time Dial (Tpset)	
0207	I> Reset type	I>	Reset Characteristic (resetdis)	
0208	I> RTMS value	I>	Reset Delay (ResetT)	
0209	I> tRESET value	I>	Reset Delay (ResetT)	
0210	I>>	I>>	Out of Service(outserv)	
0211	I>> threshold	I>>	Current Setting (Ipset)	
0212	tI>> value	I>>	Time Dial (Tpset)	
0213	I>> time delay type	I>>	Characteristic (pcharac)	the model parameter combines 0213 and 0214
0214	I>> IDMT Curve Type	I>>	Characteristic (pcharac)	the model parameter combines 0213 and 0214
0215	I>> TMS value	I>>	Time Dial (Tpset)	
0216	I>> K value (RI curve)	I>>	Time Dial (Tpset)	only for "RI-Type inverse"

Address	Relay Setting	Model block	Model setting	Note
0217	I>> Reset type	I>	Reset Characteristic (resetdis)	
0218	I> RTMS value	I>	Reset Delay (ResetT)	
0219	I> tRESET value	I>	Reset Delay (ResetT)	
0220	I>>>	I>>>	Out of Service(outserv)	
0221	I>>> Threshold	I>>>	Pickup Current (Ipset)	
0222	I>>> value	I>>>	Time Setting (Tset)	
0230	IE>	Ie>	Out of Service(outserv)	
0231	IE> threshold	Ie>	Current Setting (Ipset)	
0232	IE> time delay type	Ie>	Characteristic (pcharac)	the model parameter combines 0233 and 0232
0233	IE> IDMT Curve Type	Ie>	Characteristic (pcharac)	the model parameter combines 0233 and 0232
0234	IE> TMS value	Ie>	Time Dial (Tpset)	
0235	IE> K value (RI curve)	Ie>	Time Dial (Tpset)	only for "RI-Type inverse"
0236	tIE> value	Ie>	Time Dial (Tpset)	
0237	IE>> Reset type	Ie>	Reset Characteristic (resetdis)	
0238	IE> RTMS value	Ie>	Reset Delay (ResetT)	
0239	IE> tRESET value	Ie>	Reset Delay (ResetT)	
0240	IE>>	Ie>>	Out of Service(outserv)	
0241	IE>> threshold	Ie>>	Current Setting (Ipset)	
0242	tIE>> value	Ie>>	Time Dial (Tpset)	
0243	IE>> time delay type	Ie>>	Characteristic (pcharac)	the model parameter combines 0243 and 0244
0244	IE>> IDMT Curve Type	Ie>>	Characteristic (pcharac)	the model parameter combines 0243 and 0244
0245	IE>> TMS value	Ie>>	Time Dial (Tpset)	
0246	IE>> K value (RI curve)	Ie>>	Time Dial (Tpset)	only for "RI-Type inverse"
0250	IE>>>	Ie>>>	Out of Service(outserv)	
0251	IE>>> Threshold	Ie>>>	Pickup Current (Ipset)	
0252	IE>>> value	Ie>>>	Time Setting (Tset)	
0253	Ith>	Therm	Out of Service(outserv)	
0254	Ith> Threshold	Therm	Current Setting (Ipset)	the model parameter combines 0254 and 0256
0256	Ith> trip threshold	Therm	Current Setting (Ipset)	the model parameter combines 0254 and 0256
0259	Thermal overload time constant	Therm	Time Dial (Tpset)	
025A	I<	Undercurrent	Out of Service(outserv)	
025B	I< threshold	Undercurrent	Pickup Current (Ipset)	
026F	tI< value	Undercurrent	Time Setting (Tset)	
025C	I2>	I2>	Out of Service(outserv)	
025D	I2> threshold	I2>	Current Setting (Ipset)	
025E	I2> time delay type	I2>	Characteristic (pcharac)	the model parameter combines 025E and 025F
025F	I2> IDMT Curve Type	I2>	Characteristic (pcharac)	the model parameter combines 025E and 025F
0260	I2> TMS value	I2>	Time Dial (Tpset)	
0261	I2> K value (RI curve)	I2>	Time Dial (Tpset)	only for "RI-Type inverse"
0262	tI2> value	I2>	Time Dial (Tpset)	
0263	I2>> Reset type	I2>	Reset Characteristic (resetdis)	
0264	I2> RTMS value	I2>	Reset Delay (ResetT)	
0265	I2> tRESET value	I2>	Reset Delay (ResetT)	
	I2>>	I2>>	Out of Service(outserv)	
	I2>> Threshold	I2>>	Pickup Current (Ipset)	
	I2>> value	I2>>	Time Setting (Tset)	

Address	Relay Setting	Model block	Model setting	Note
0270	Recloser valid	Reclosing	Out of Service(outserv)	
0277	Dead time 1	Reclosing	Reclosing interval 1 (recltime1)	
0278	Dead time 2	Reclosing	Reclosing interval 2 (recltime2)	
0279-027A	Dead time 3	Reclosing	Reclosing interval 3 (recltime3)	
027B-027C	Dead time 4	Reclosing	Reclosing interval 4 (recltime4)	
027D-027E	Reclaim time	Reclosing	Reset Time (resettime)	
0283	I> Phase cycle configuration	Reclosing	"IM" row in the table	In the "Logic" tab page
0284	I>> Phase cycle configuration	Reclosing	"IMM" row in the table	In the "Logic" tab page
0285	I>>> Phase cycle configuration	Reclosing	"IMMM" row in the table	In the "Logic" tab page
0286	IE> Phase cycle configuration	Reclosing	"INM" row in the table	In the "Logic" tab page
0287	IE>> Phase cycle configuration	Reclosing	"INMM" row in the table	In the "Logic" tab page
0288	IE>>> Phase cycle configuration	Reclosing	"INMMM" row in the table	In the "Logic" tab page

P127   :

Address	Relay Setting	Model block	Model setting	Note
0200	I> operating mode	I>	Out of Service(outserv)	
0201	I> value	I>	Current Setting (Ipset)	
0202	Trip time type I>	I>	Characteristic (pcharac)	
0203	DMT Trip time I>	I>	Time Dial (Tpset)	
0204	TMS: I> trip time multiplier	I>	Time Dial (Tpset)	
0205	K: I>trip time multiplier for RI type curve	I>	Time Dial (Tpset)	only for "RI-Type inverse"
0206	Reset time type: DMT /IDMT	I>	Reset Characteristic (resetdis)	
0207	DMT reset time I>	I>	Reset Delay (ResetT)	
0208	TMS: I> reset time multiplier	I>	Reset Delay (ResetT)	
0209	Torque (RCA) angle IÛ>	Dir I>	Max. Torque Angle (mta)	In the "Voltage Polarizing" tab page
020A	Trip angle IÛ>	Dir I>	Angle operating sector (phisec)	Divide by 2 the relay setting
020C	I>>	I>>	Out of Service(outserv)	
020D	I>> threshold	I>>	Current Setting (Ipset)	
020E	tI>> value	I>>	Time Dial (Tpset)	
020F	Torque (RCA) angle IÛ>>	Dir I>>	Max. Torque Angle (mta)	In the "Voltage Polarizing" tab page
0210	Trip angle IÛ>>	Dir I>>	Angle operating sector (phisec)	Divide by 2 the relay setting
0211	I>>>	I>>>	Out of Service(outserv)	
0212	I>>> Threshold	I>>>	Pickup Current (Ipset)	
0213	I>>> value	I>>>	Time Setting (Tset)	
0214	Torque (RCA) angle IÛ>>>	Dir I>>>	Max. Torque Angle (mta)	In the "Voltage Polarizing" tab page
0215	Trip angle IÛ>>>	Dir I>>>	Angle operating sector (phisec)	Divide by 2 the relay setting
0216	Ie> operation mode	Ie>	Out of Service(outserv)	
0217	Ie> value	Ie>	Current Setting (Ipset)	
0218	Trip time type Ie>	Ie>	Characteristic (pcharac)	

Address	Relay Setting	Model block	Model setting	Note
0219	DMT Trip time Ie>	Ie>	Time Dial (Tpset)	
021A	TMS : Ie> trip time multiplier	Ie>	Time Dial (Tpset)	
021B	K: Ie> trip time multiplier for RI type curve	Ie>	Time Dial (Tpset)	only for "RI-Type inverse"
021C	Ie> Reset time type: DMT /IDMT	Ie>	Reset Characteristic (resetdis)	
021D	DMT reset time Ie>	Ie>	Reset Delay (ResetT)	
021E	TMS: Ie> reset time multiplier	Ie>	Reset Delay (ResetT)	
021F	Ue> value	Dir Ie>	Polarizing Voltage (up-olur)	In the "Voltage Polarizing" tab page
0220	Torque (RCA) angle IeÛe>	Dir Ie>	Max. Torque Angle (mta)	In the "Voltage Polarizing" tab page
0221	Trip angle Iê>	Dir Ie>	Angle operating sector (phisec)	Divide by 2 the relay setting
0223	Ie>> operation mode	Ie>>	Out of Service(outserv)	
0224	Ie>> threshold	Ie>>	Current Setting (Ipset)	
0225	Trip Time Ie>>	Ie>>	Time Dial (Tpset)	
0226	Ue>> value	Dir Ie>>	Polarizing Voltage (up-olur)	In the "Voltage Polarizing" tab page
0227	Torque (RCA) angle IeÛe>>	Dir Ie>>	Max. Torque Angle (mta)	In the "Voltage Polarizing" tab page
0228	Trip angle IeÛ>>	Dir Ie>>	Angle operating sector (phisec)	Divide by 2 the relay setting
0229	Ie>>> operation mode	Ie>>>	Out of Service(outserv)	
022A	Ie>>> Threshold	Ie>>>	Pickup Current (Ipset)	
022B	Ie>>> value	Ie>>>	Time Setting (Tset)	
022C	Ue>>> value	Dir Ie>>>	Polarizing Voltage (up-olur)	In the "Voltage Polarizing" tab page
022D	Torque (RCA) angle IeÛe>>>	Dir Ie>>>	Max. Torque Angle (mta)	In the "Voltage Polarizing" tab page
022E	Trip angle IeÛe>>>	Dir Ie>>>	Angle operating sector (phisec)	Divide by 2 the relay setting
0239	I2> operation mode	I2>	Out of Service(outserv)	
023A	I2> value	I2>	Current Setting (Ipset)	
023B	Trip time type I2>	I2>	Characteristic (pcharac)	
023C	DMT Trip time I2>	I2>	Time Dial (Tpset)	
023D	TMS : I2> trip time multiplI2r	I2>	Time Dial (Tpset)	
023E	K: I2> trip time multiplI2r for RI type curve	I2>	Time Dial (Tpset)	only for "RI-Type inverse"
023F	I2> Reset time type: DMT /IDMT	I2>	Reset Characteristic (resetdis)	
0240	DMT reset time I2>	I2>	Reset Delay (ResetT)	
0241	TMS: I2> reset time multi-plI2r	I2>	Reset Delay (ResetT)	
0242	I2>> operation mode	I2>>	Out of Service(outserv)	
0243	I2>> threshold	I2>>	Current Setting (Ipset)	
0244	Trip Time I2>>	I2>>	Time Dial (Tpset)	
0245	I2>>> operation mode	I2>>>	Out of Service(outserv)	
0246	I2>>> Threshold	I2>>>	Pickup Current (Ipset)	
0247	I2>>> value	I2>>>	Time Setting (Tset)	
0270	Recloser valid	Reclosing	Out of Service(outserv)	
0278	Dead time 1	Reclosing	Reclosing interval 1 (re-cltime1)	
0279	Dead time 2	Reclosing	Reclosing interval 2 (re-cltime2)	
027A-027B	Dead time 3	Reclosing	Reclosing interval 3 (re-cltime3)	
027C-027D	Dead time 4	Reclosing	Reclosing interval 4 (re-cltime4)	

Address	Relay Setting	Model block	Model setting	Note
027E-027F	Reclaim time	Reclosing	Reset Time (resettime)	
0282	I> Phase cycle configuration	Reclosing	"IM" row in the table	In the "Logic" tab page
0282	I>> Phase cycle configuration	Reclosing	"IMM" row in the table	In the "Logic" tab page
0282	I>>> Phase cycle configuration	Reclosing	"IMMM" row in the table	In the "Logic" tab page
0283	IE> Phase cycle configuration	Reclosing	"INM" row in the table	In the "Logic" tab page
0283	IE>> Phase cycle configuration	Reclosing	"INMM" row in the table	In the "Logic" tab page
0283	IE>>> Phase cycle configuration	Reclosing	"INMMM" row in the table	In the "Logic" tab page
0248	U< operating mode	U<	Out of Servive (outserv)	
0249	U< value	U<	Pickup Voltage (Usetr)	
024A	Trip time U<	U<	Time Delay (Tdel)	
024B	U<< operating mode	U<<	Out of Servive (outserv)	
024C	U<< value	U<<	Pickup Voltage (Usetr)	
024D	Trip time U<<	U<<	Time Delay (Tdel)	
0268	U> operating mode	U>	Out of Servive (outserv)	
0269	U> value	U>	Pickup Voltage (Usetr)	
026A	Trip time U>	U>	Time Delay (Tdel)	
026B	U>> operating mode	U>>	Out of Servive (outserv)	
026C	U>> value	U>>	Pickup Voltage (Usetr)	
026D	Trip time U>>	U>>	Time Delay (Tdel)	
026E	Ue>>> > operating mode	Ue>>> >	Out of Service (outserv)	
026F	Ue>>> > value	Ue>>> >	Pickup Voltage (Usetr)	
0270	Trip time Ue>>> >	Ue>>> >	Time Delay (Tdel)	

3.3   Output logic

It represents the output stage of the relay; it's the interface between the relay and the power breaker.

3.3.1   Available elements and relay output signals

The trip logic is implemented by the "Logic" block. In the *P12x* and in the *P127* relay model 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.

The relay trip output signalis "yout", the relay closing command output signal is "yout1".

3.3.2   Functionality

The "Logic" block collects the trip signals coming from the overcurrent protective elements and, when any protective element trips, operates the power breaker and the "yout" relay output contact.

The "Closing Logic" block is controlled by the closing signal coming from the "Reclosing" block and, when a reclosing attempt is initiated, triggers the closing command for the power breaker and operates the "yout1" relay output contact .

3.3.3   Data input

To disable the relay model ability to open the power circuit breaker simply disable the "Logic" block.

To disable the relay model ability to close the power circuit breaker simply disable the "Closing Logic" block.

4   Features not supported

The following features are not supported:

4.1   P120

- Restricted earth fault.

4.2   P12x (Micom P121,P122,P123)

- Cold load pickup.
- Restricted earth fault.
- Circuit breaker failure detection.
- Trip circuit supervision.

4.3   P127 (Micom P125,P126,P127)

- Cold load pickup.
- Restricted earth fault.
- Circuit breaker failure detection.
- Trip circuit supervision.

5 References

[1] Areva T&D, Automation & Information Systems Business, Tour AREVA 1, place Jean Millier 92084 Paris - La Défense, 92084 France. *MiCOM P120, P121, P122 & P123 Application Notes P12x/EN AP/D00*, 2004.

[2] Areva T&D, Automation & Information Systems Business, Tour AREVA 1, place Jean Millier 92084 Paris - La Défense, 92084 France. *MiCOM P120/P121/P122/P123 Overcurrent Relays Version 11 Technical Guide P12X/EN T/B96*, 2004.

[3] Areva T&D, Automation & Information Systems Business, Tour AREVA 1, place Jean Millier 92084 Paris - La Défense, 92084 France. *MiCOM P120/P121/P122/P123 Overcurrent Relays Version 6 Technical Guide P12X/EN T/G75*, 2004.

[4] Areva T&D, Automation & Information Systems Business, Tour AREVA 1, place Jean Millier 92084 Paris - La Défense, 92084 France. *MiCOM P125/P126 & P127 Directional/Non-directional Relay V6D Technical Guide P12Y/EN T/H42*, 2004.

[5] Areva T&D, Automation & Information Systems Business, Tour AREVA 1, place Jean Millier 92084 Paris - La Défense, 92084 France. *MiCOM P125/P126/P127 Directional/Non-directional Relay Technical Guide P12Y/EN T/E32*, 2004.