SIEMENS

SIPROTEC Compact Application Note

Constant Drop-Off for Sensitive EFP

SIP Compact-APN-001, Edition 1

SIPROTEC Compact – Application Note Constant Drop-Off for Sensitive Earth Fault Protection

SIP Compact-APN-001, Edition 1

Content

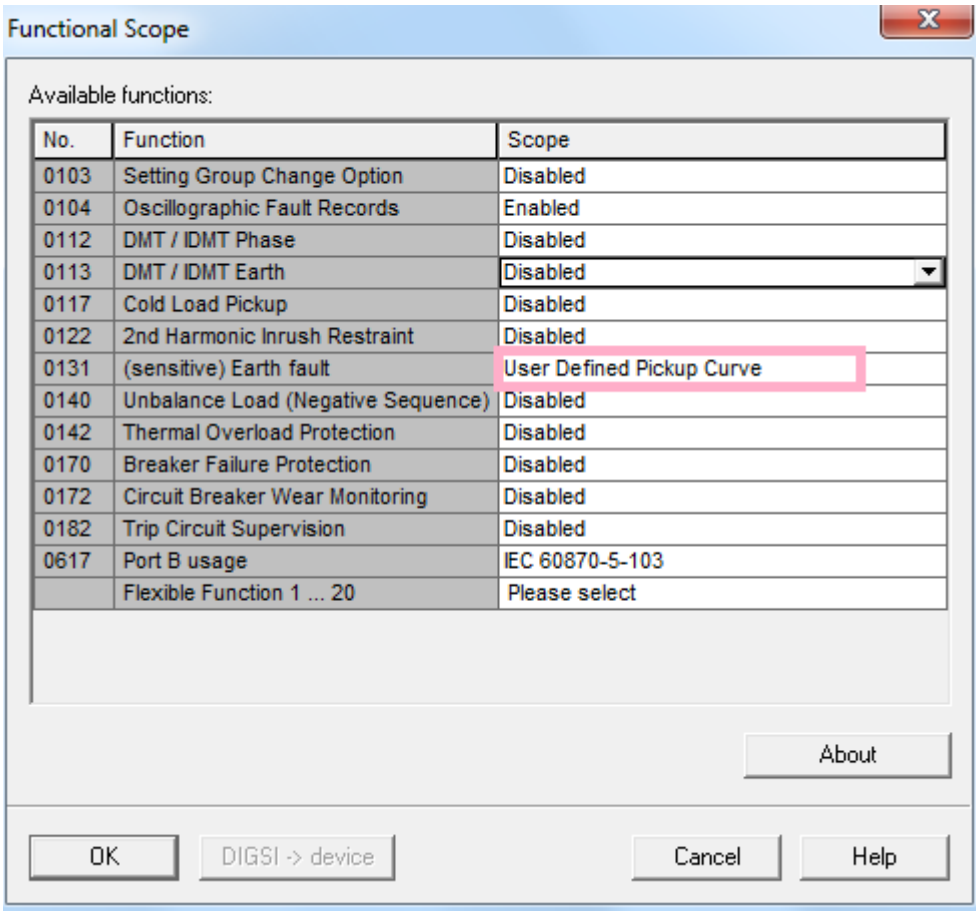
1 Constant Drop-Off for Sensitive Earth Fault Prot.

1.1 Introduction

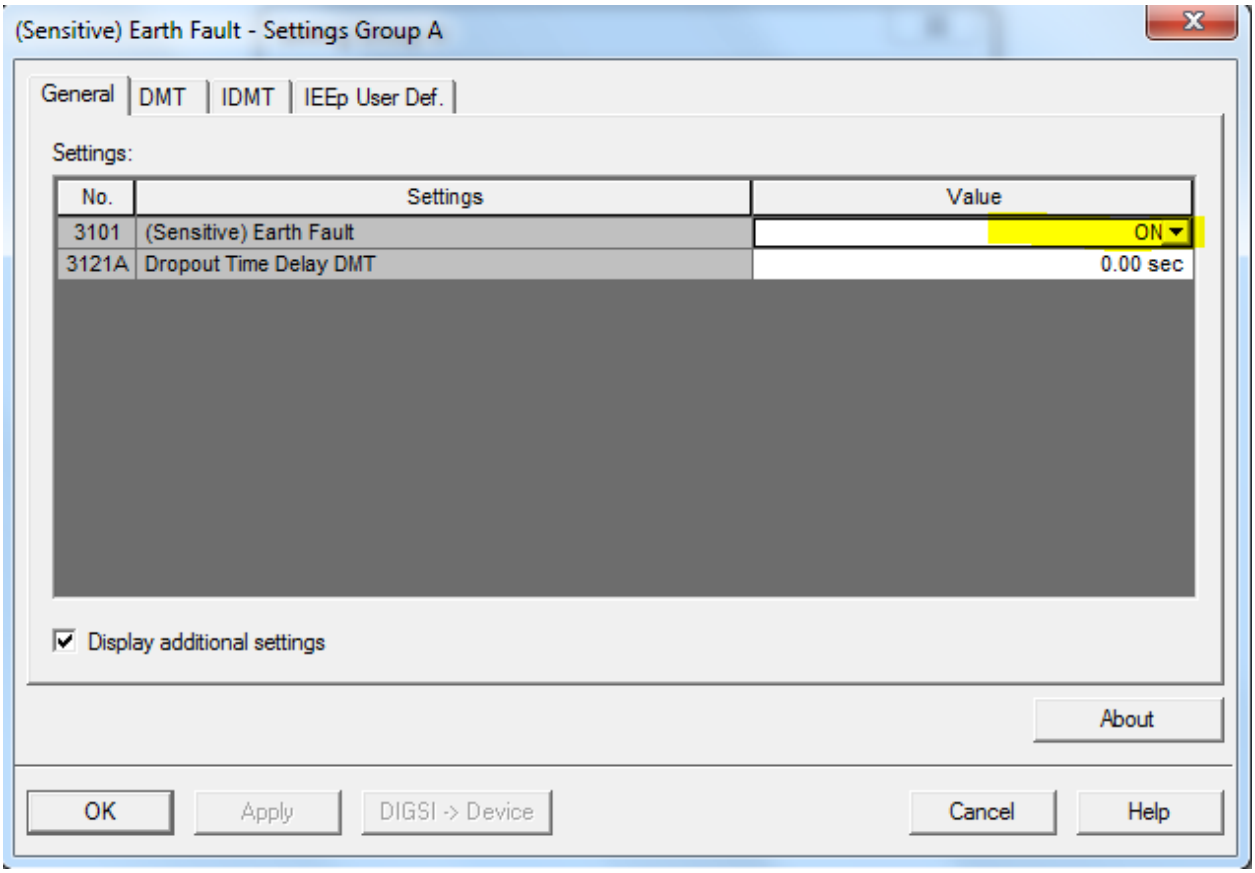
Some customers request a constant drop-off of 95% even for the sensitive earth fault element.
The 7SJ80 relay manual specifies an operating time tolerance of 7% for the sensitive earth fault protection with user-defined characteristic.
By the following application using the pickup of the sensitive earth fault protection, a timer of the Flexible Functions and some CFC logic, a constant drop-off ratio of 95% can be achieved even for currents below 300 mA.

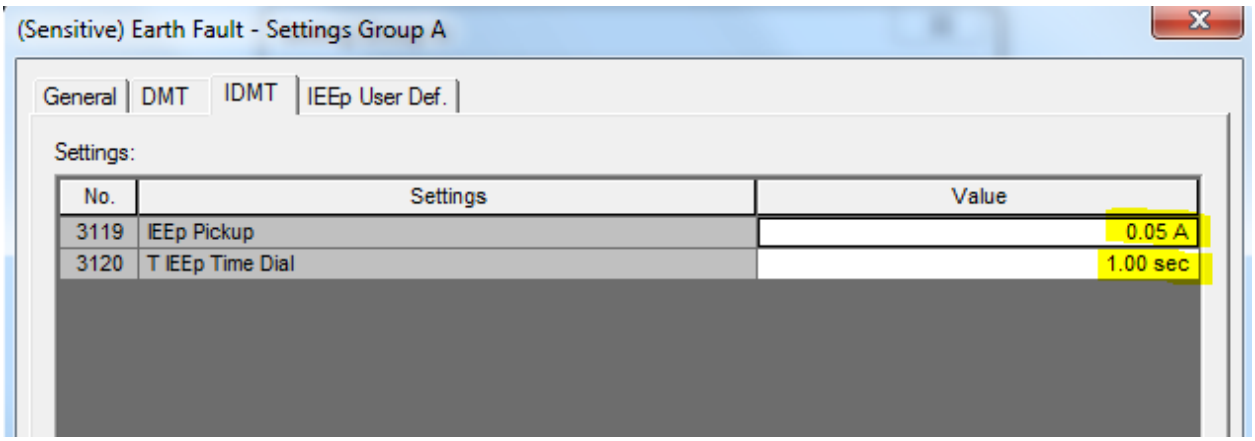
1.2 Application Note

First you have to enable the function "131 (sensitive) Earth fault" with "User Defined Pickup Curve" in the "Device Configuration" menu in DIGSI as given in the following screen shot

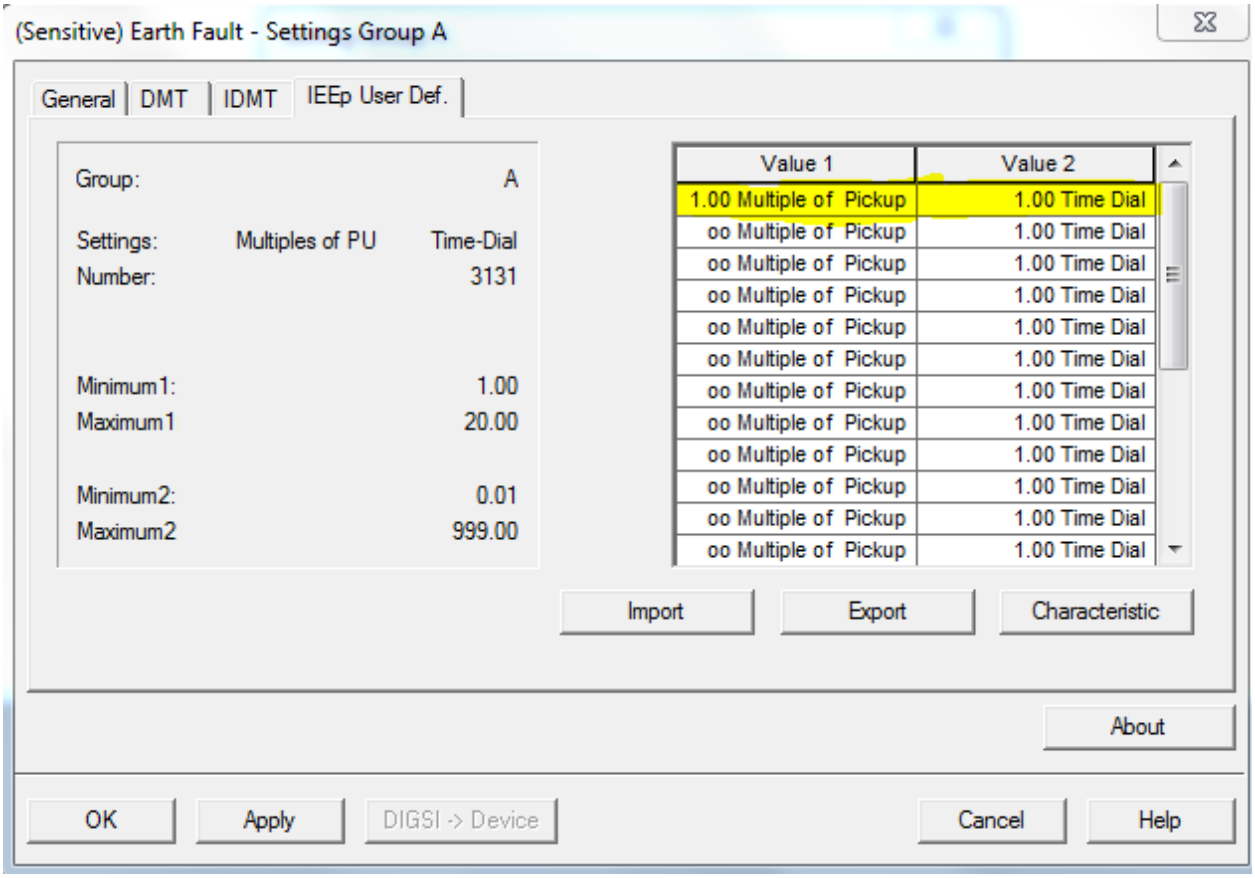


In “Setting Group-A”, enable “3101 (Sensitive) Earth Fault” and keep the earth fault pickup setting “3119 IEEp Pickup”and the time delay “3120 T IEEp Time Dial”





Then also define the 1st pair of user defined curve as shown below.



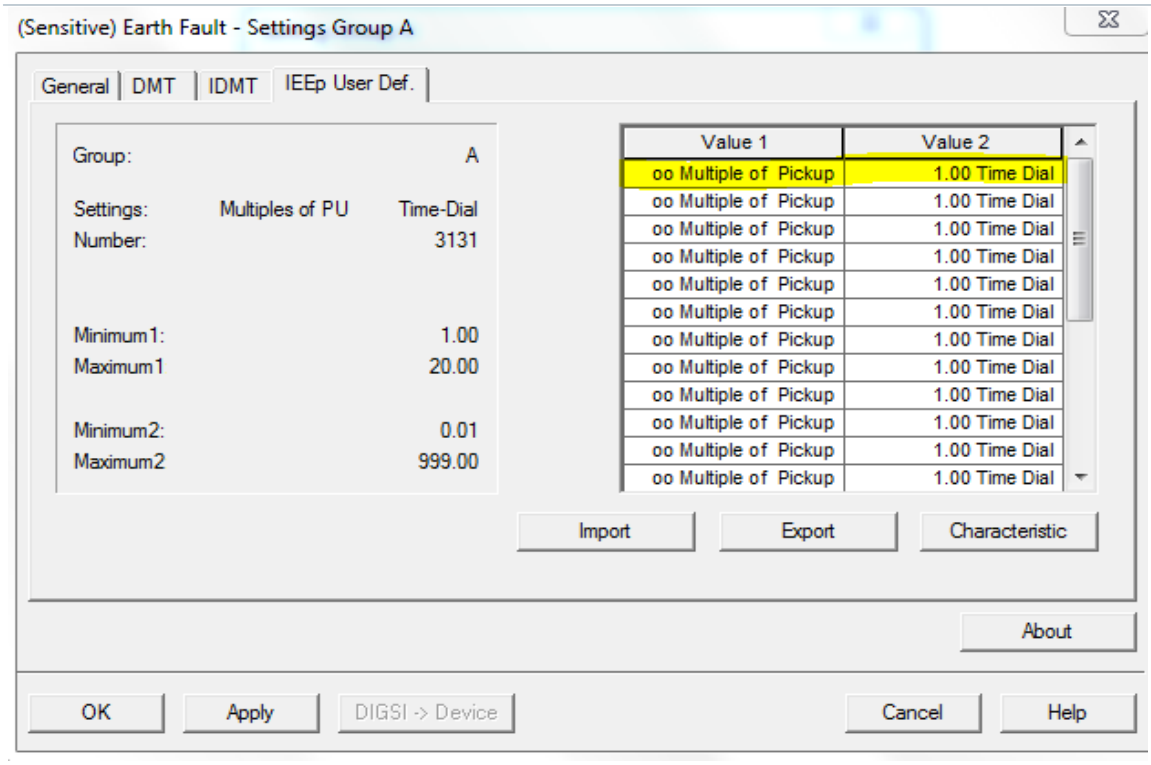
Note: The operating time tolerance with this user defined curve is 7% or 70msec,

Excerpt from 7SJ80 device manual:

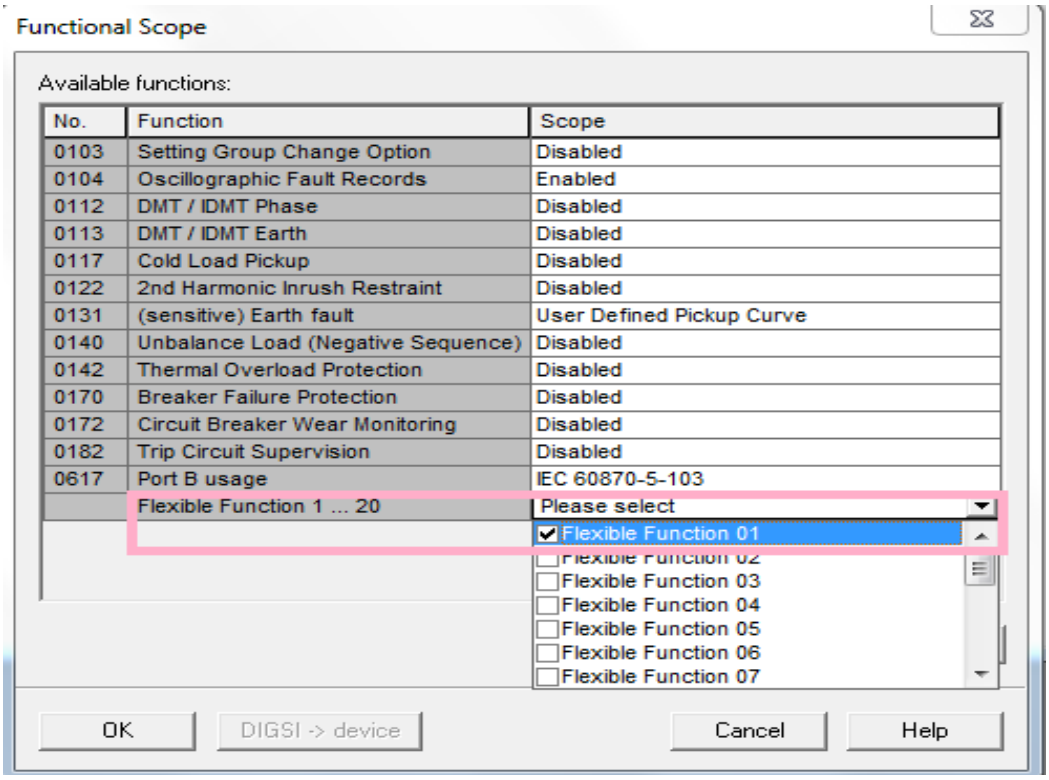
Operating time tolerance in linear range	7 % of reference (calculated) value for $2 \le I/I_{51Ns} \le 20$ + 2 % current tolerance, or 70 ms

If this time tolerance is not suitable for your application, you can enable "Flexible Function-01" and make a simple CFC logic to reduce the time tolerance,

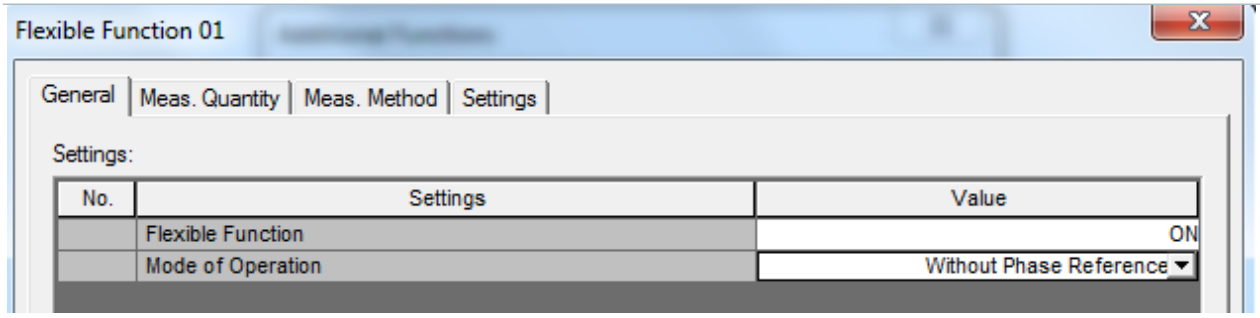
➔ In this case don't define the values in the user defined curve and keep the setting as oo (infinite)



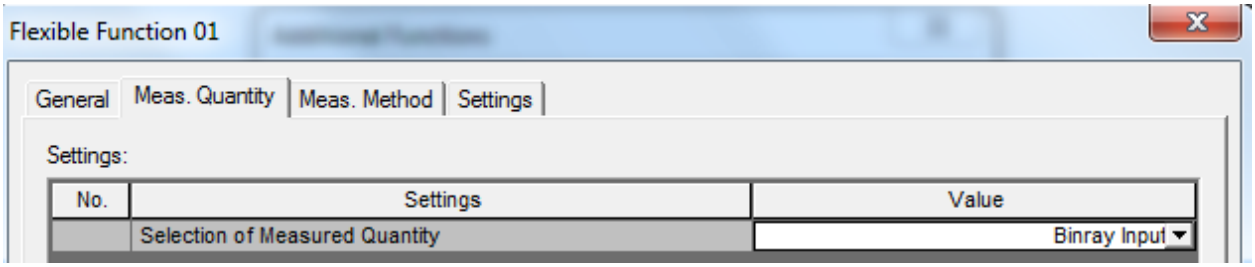
Afterwards enable "Flexible Function 01" under "Device Configuration" menu in DIGSI menu as shown below

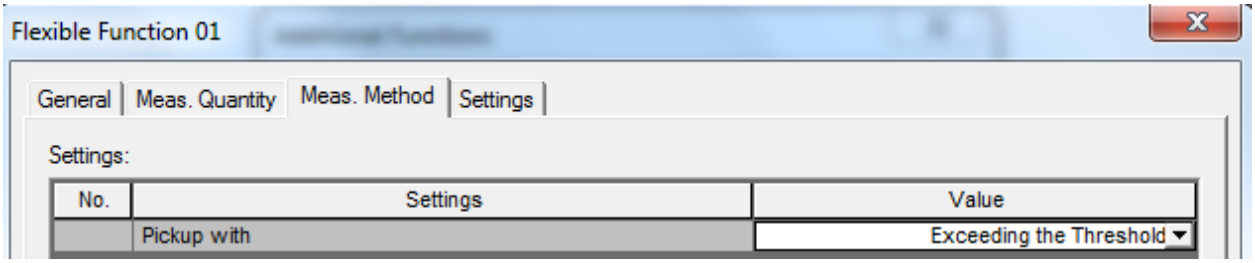


Under "Additional Function", switch the "Flexible Function 01" on and select the mode as "Without Phase Reference".

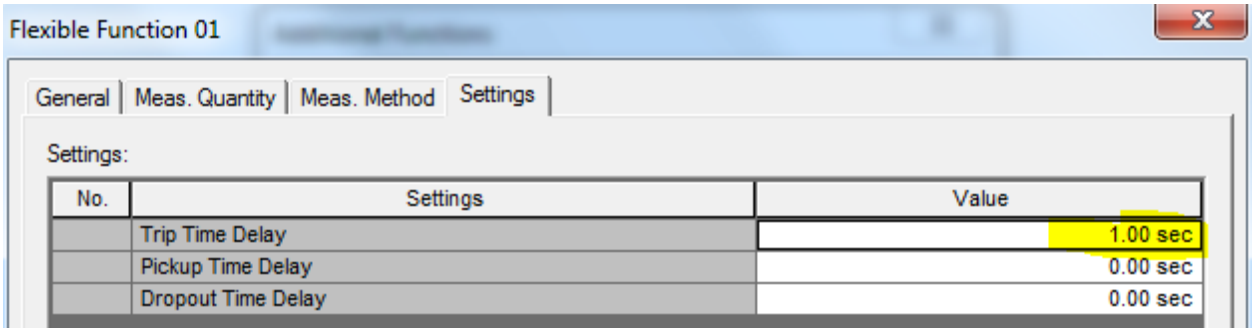


Then configure the following parameters:





After that set the time delay for the earth fault as required by the customer.



In the next step open the "IO Matrix" and mask the Sensitive earth fault signal "1227 IEEp Pickup" to "Destination CFC".

	Information				Source					Destination																	
	Number	Display text	Long text	Type	BI			F	S	C	BO					LEDs								Buffer			S	C	CM
					1	2	3				1	2	3	4	5	1	2	3	4	5	6	7	8	0	S	T			
Device									×	×														×			×	×	×
P.System Data 1																								×			×		
Osc. Fault Rec.										×														×			×	×	
P.System Data 2													×	×	×	×	×							×		×	×	×	
Measurem.Superv																								×			×		
Sens. E Fault	01202	>BLOCK IEE>>	>BLOCK IEE>>	SP																				IO			X		
	01204	>BLOCK IEEp	>BLOCK IEEp	SP																				IO			X		
	01207	>BLK Sens.Earth	>BLOCK Sensitive Earth fault protection	SP																				IO			X		
	01211	Sens. Earth OFF	Sensitive Earth fault protection is OFF	OUT																				IO			X		
	01212	Sens. Earth ACT	Sensitive Earth fault prot. is ACTIVE	OUT																				IO			X		
	01221	IEE>> Pickup	IEE>> Pickup	OUT																						IO	X		
	01223	IEE>> TRIP	IEE>> TRIP	OUT										U	U				L							I	X		
	01227	IEEp Pickup	IEEp picked up	OUT																						IO	X	X	
	01229	IEEp TRIP	IEEp TRIP	OUT																						I	X		
	01230	Sens. E BLOCKED	Sensitive Earth fault detection BLOCKED	OUT																				IO		IO	X		

Mask Here

Afterwards mask the signal "235.2112.01 Flx01 Dir. TRIP" to "Source CFC" as given in the following screen shot.

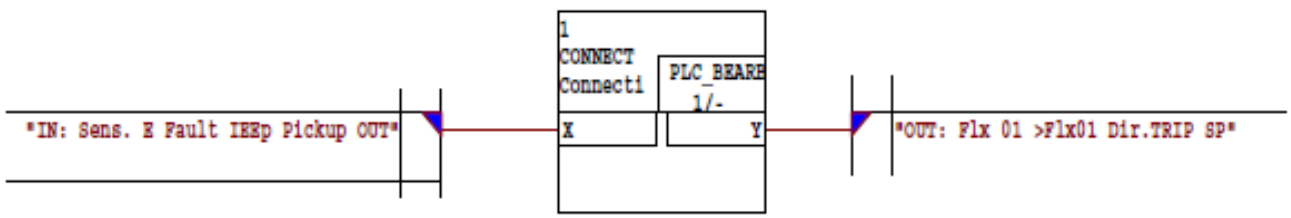
	Information				Source						Destination												
	Number	Display text	Long text	Type	BI			F	S	C	BO					LEDs							
					1	2	3				1	2	3	4	5	1	2	3	4	5	6	7	8
Device									×	×													
P.System Data 1																							
Osc. Fault Rec.										×													
P.System Data 2													×	×	×	×	×						
Measurem.Superv																							
Sens. E Fault															×	×			×				
Cntrl Authority																							
Control Device						×	×		×														
Process Data																							
Measurement																							
Set Points(MV)																							
Energy																							
Statistics																							
SetPoint(Stat)																							
Thresh.-Switch																							
Flx 01	235.2110.01	>BLOCK Flx01	>BLOCK Function Flx01	SP																			
	235.2111.01	>Flx01 instant.	>Function Flx01 instantaneous TRIP	SP																			
	235.2112.01	>Flx01 Dir.TRIP	>Function Flx01 Direct TRIP	SP																			
	235.2113.01	>Flx01 BLK.TDly	>Function Flx01 BLOCK TRIP Time Delay	SP																			
	235.2114.01	>Flx01 BLK.TRIP	>Function Flx01 BLOCK TRIP	SP																			
	235.2118.01	Flx01 BLOCKED	Function Flx01 is BLOCKED	OUT																			
	235.2119.01	Flx01 OFF	Function Flx01 is switched OFF	OUT																			

Mask Here

In the second last step you have to insert a CFC chart. In this CFC chart you have to connect the pickup signal of the SEF function to the Flexible Function 01 by means of a "CONNECT" block as shown in the following screen shot.

Note: Do not forget to bring this logic under "Run Sequence from "Measurement Processing" to "Fast PLC" level.

CFC Logic



Finally you have to mask the signal "235.2126.01 Flx01 TRIP" to one binary output, e.g. BO 1 as "Unlatched".

Hence you will have the following options for the tripping of the relay:

Output used for Tripping the relay

Number	Display Text	Long Text	Configuration	Remark
00511	Relay Trip	Relay GENERAL TRIP command	Unlatched	Option 1
235.2126.01	FLx01 TRIP	Function Flx01 TRIP	Unlatched	Option 2

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Application Note: SIP Compact-APN-001, Edition 1

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