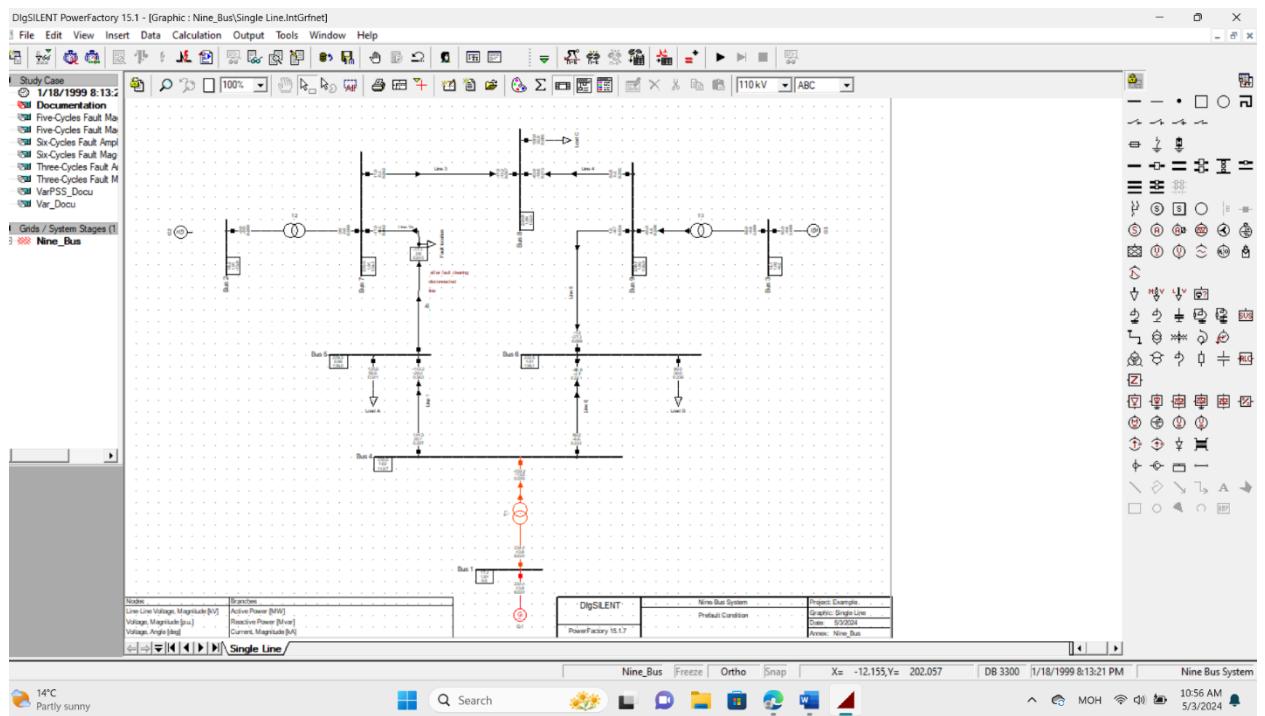


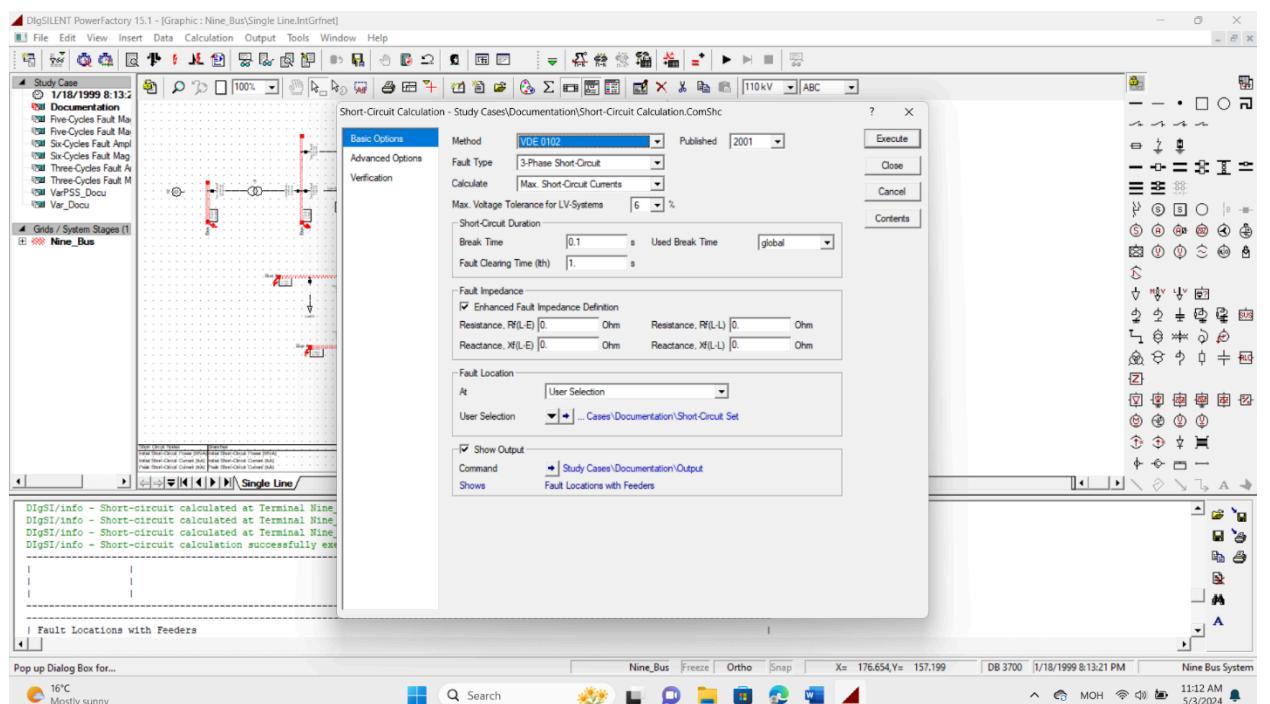
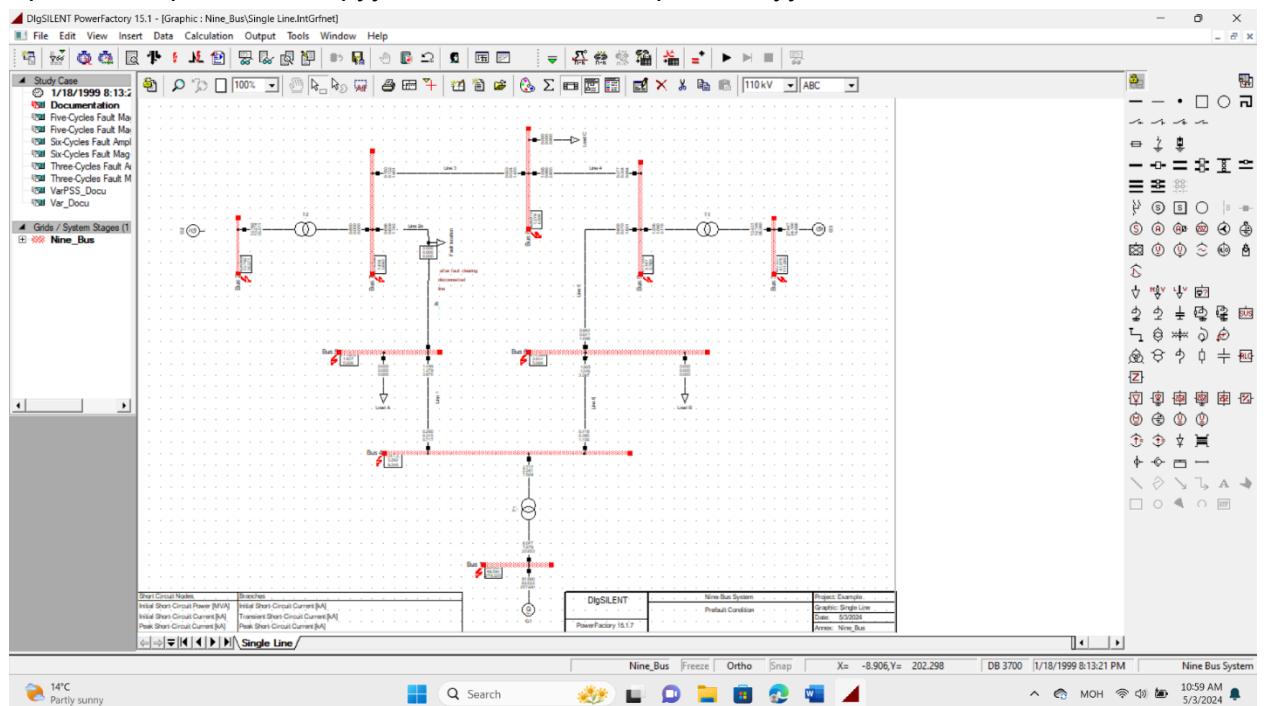
Энэхүү бие даалтыг хийхийн тулд 9 Bus систем дээр хийж гүйцэтгэх ба энэ ажил дээр чадлын урсгалын тооцоо , богино залгааны тооцоо, хүснэгтлэх (стандарт болгоноор нь) хийж харицуулах.

(бүх шин дээр) гүйдлийн трансформатор тогторхутар

1. Execute хийнэ .



2. Бүх шин дээр БЗ хийж харуулсан байдал стандартын дагуу .



3.

4. Үр дүн нь

DlgSILENT PowerFactory 15.1 - [Graphic: Nine_Bus\Single Line\IntGrfnet]

File Edit View Insert Data Calculation Output Tools Window Help

Fault Locations with Feeders
Short-Circuit Calculation / Method : complete
3-Phase Short-Circuit / Max. Short-Circuit Currents

Short-Circuit Duration
Break Time 0.10 s | Fault Impedance
Resistance, Rf 0.00 Ohm |
Fault Clearing Time (Ith) 1.00 s | Reactance, Xf 0.00 Ohm |

Grid: Nine_Bus System Stage: Nine_Bus Annex: / 1

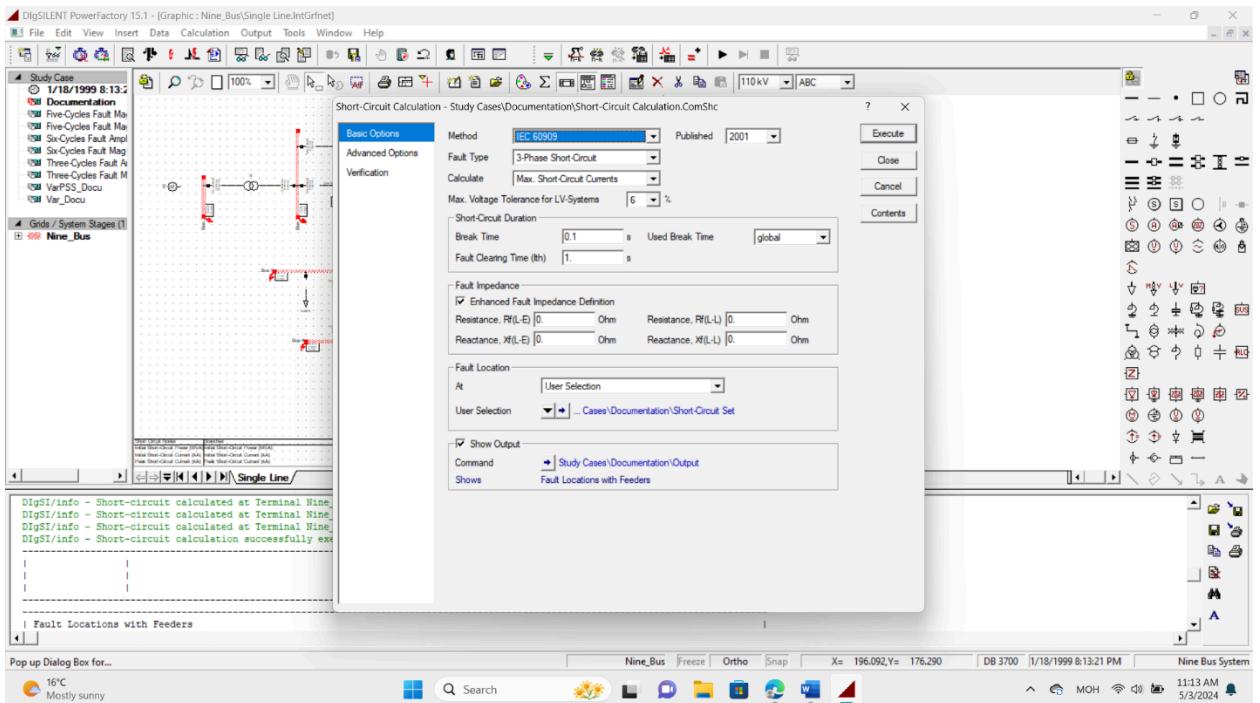
	rtd.V. [kV]	Voltage [kV]	c- [deg]	S ⁺ Factor	[MVA/MVA]	I ⁺ [kA/kA]	I ⁻ [deg]	I ^p [kA]	I ^b [kA/kA]	I ^b [kA]	I th [kA]	
Bus 1	16.50	0.00	0.00	1.00	2864.28 MVA	99.59 kA	-86.5	69.39	-94.9	279.33 kA	71.78	230.21 111.83
T1					230.83 MVA	8.08 kA	76.9	7.68	77.4	22.65 kA		
G1					2625.83 MVA	91.88 kA	-85.1	62.02	-82.7	257.69 kA		
Bus 2	18.00	0.00	0.00	1.00	429.99 MVA	13.79 kA	-93.6	13.27	-92.6	35.57 kA	13.32	21.13 14.09
T2					429.99 MVA	13.79 kA	86.2	13.27	87.2	35.57 kA		
Bus 3	13.80	0.00	0.00	1.00	981.86 MVA	41.08 kA	-92.2	36.85	-91.1	111.26 kA	37.20	91.83 42.97
T3					321.04 MVA	13.43 kA	87.4	12.75	88.7	36.38 kA		
G3					660.83 MVA	27.65 kA	-92.1	24.10	-91.0	74.89 kA		
Bus 4	230.00	0.00	0.00	1.00	1347.56 MVA	3.35 kA	63.6	2.91	64.4	5.35 kA	2.94	7.96 3.67
T1					102.55 MVA	2.72 kA	-115.1	0.28	-112.7	7.51 kA		
Line 1					103.42 MVA	0.28 kA	-122.6	0.25	-122.0	0.72 kA		
Bus 5					166.68 MVA	0.42 kA	-122.9	0.39	-122.3	1.16 kA		
Bus 6	230.00	0.00	0.00	1.00	771.64 MVA	1.94 kA	63.2	1.79	64.6	5.01 kA	1.80	2.82 1.98
Line 1					597.34 MVA	1.50 kA	-114.8	1.38	-113.2	3.88 kA		
Line 2					175.99 MVA	0.44 kA	-123.8	0.42	-123.0	1.14 kA		
Load A					0.00 MVA	0.00 kA	0.0	0.00	0.0	0.00 kA		
Bus 7	230.00	0.00	0.00	1.00	814.39 MVA	2.04 kA	64.1	1.89	65.2	5.09 kA	1.90	2.77 2.08
Line 5					271.76 MVA	0.68 kA	-119.9	0.64	-119.2	1.70 kA		
Line 6					543.62 MVA	1.36 kA	-113.9	1.25	-112.5	3.40 kA		
Load B					0.00 MVA	0.00 kA	0.0	0.00	0.0	0.00 kA		
Bus 8	230.00	0.00	0.00	1.00	579.39 MVA	1.45 kA	60.5	1.38	61.6	3.64 kA	1.39	2.08 1.48
Line 2					277.26 MVA	0.70 kA	-117.0	0.66	-115.7	1.74 kA		
T2					0.00 MVA	0.00 kA	0.0	0.00	0.0	0.00 kA		

Nine_Bus Freeze Ortho Snap Ln 175, Col 2 DB 3700 1/18/1999 8:13:21 PM Nine Bus System

14°C Partly sunny

Search

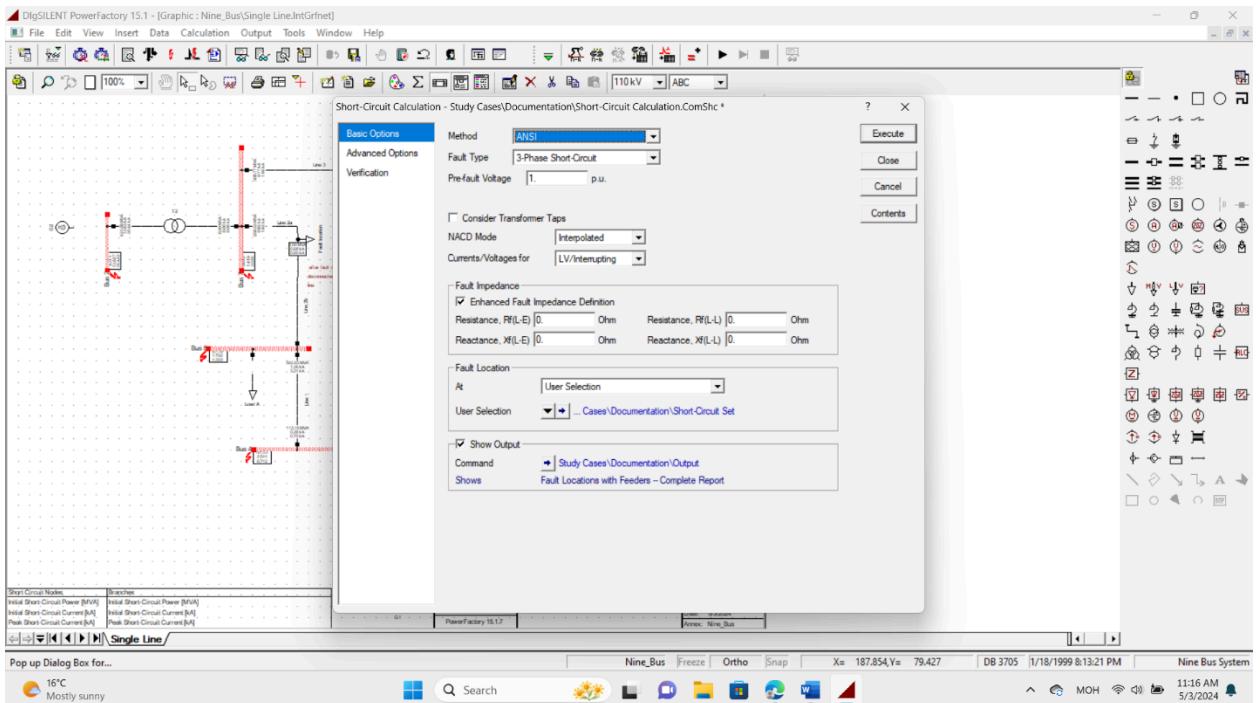
Дараагийн стандарт IEC 60929



Үр дүн

DIGS/Info - Short-circuit calculation successfully executed!													
DIGSILENT Project: PowerFactory ----- 15.1.7 Date: 5/3/2024													
Fault Locations with Feeders													
Short-Circuit Calculation / Method : IEC 60909 3-Phase Short-Circuit / Max. Short-Circuit Currents													
Asynchronous Motors Grid Identification Short-Circuit Duration Always Considered Automatic Break Time 0.10 s Decaying Aperiodic Component (Idc) Conductor Temperature Fault Clearing Time (Ith) 1.00 s Using Method B User Defined c-Voltage Factor User Defined No													
Grid: Nine_Bus System Stage: Nine_Bus Annex: / 1													
rtd.V. Voltage C- SK* Ik* ip Ib Sb Annex: / 1													
[kV] [kV] [deg] Factor [MVA/MVA] [kA/kA] [deg] [kA/kA] [kA] [MVA] [kA] [kA]													
Bus 1 16.50 0.00 0.00 1.10 1489.02 MVA 52.10 kA -86.77 136.15 kA 41.99 1200.08 52.10 53.40													
T1 Bus 4 1235.96 MVA 8.86 kA 95.04 253.21 MVA 8.86 kA 95.04 23.15 kA 13.83 kA 43.25 kA 8.86 kA 94.06													
G1													
Bus 2 18.00 0.00 0.00 1.10 431.08 MVA 13.83 kA -85.94 35.44 kA 13.83 431.08 13.83 14.10													
T2 Bus 7 431.08 MVA 13.83 kA 94.06 431.08 MVA 13.83 kA 94.06 35.44 kA													
Bus 3 13.80 0.00 0.00 1.10 1000.62 MVA 41.86 kA -86.41 108.51 kA 34.28 819.48 41.86 42.81													
T3 Bus 9 294.27 MVA 12.31 kA 95.35 706.55 MVA 12.31 kA 95.35 31.91 kA 31.91 kA 706.55 MVA 29.56 kA 97.14													
G3													
Bus 4 230.00 0.00 0.00 1.10 1013.37 MVA 2.54 kA -87.14 6.71 kA 2.43 968.60 2.54 2.62													
T1 Bus 1 732.19 MVA 1.81 kA 91.67 502.03 MVA 1.26 kA 93.92 4.78 kA 4.78 kA 502.03 MVA 1.26 kA 95.57													
Line 1 Bus 5 113.10 MVA 0.28 kA 93.61 178.75 MVA 0.45 kA 97.20 0.75 kA 0.75 kA 178.75 MVA 0.45 kA 97.20													
Line 2 Bus 6 178.75 MVA 0.45 kA 97.20 178.75 MVA 0.45 kA 97.20 1.18 kA 1.18 kA 178.75 MVA 0.45 kA 97.20													
Bus 5 230.00 0.00 0.00 1.10 677.87 MVA 1.70 kA -85.65 4.33 kA 1.70 677.87 1.70 1.73													
Line 1 Bus 4 502.03 MVA 1.26 kA 93.92 175.90 MVA 0.44 kA 95.57 3.21 kA 3.21 kA 175.90 MVA 0.44 kA 95.57													
Line 2 Bus 7 175.90 MVA 0.44 kA 95.57 175.90 MVA 0.44 kA 95.57 1.12 kA 1.12 kA 175.90 MVA 0.44 kA 95.57													
Bus 6 230.00 0.00 0.00 1.10 733.92 MVA 1.84 kA -84.25 4.55 kA 1.83 730.20 1.84 1.87													

Дараагийн шин дээр ANSI



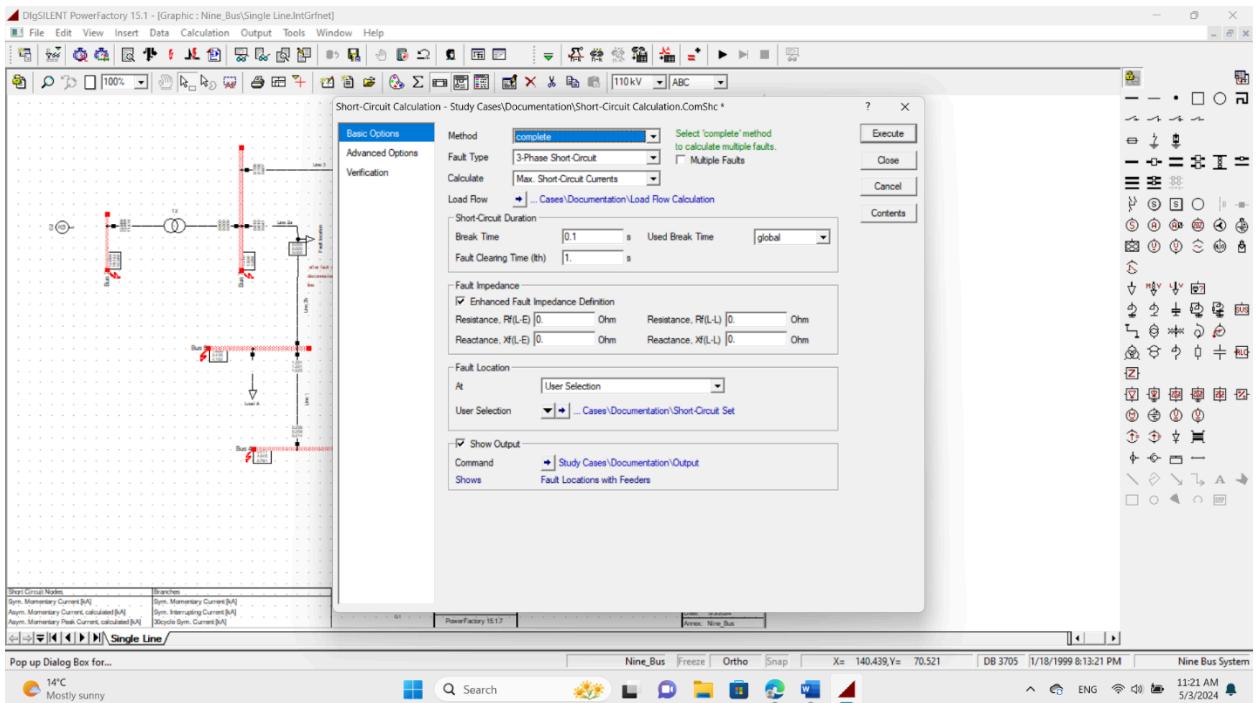
Үр дүн

DigSILENT - Short-circuit calculation successfully executed!									
Project: PowerFactory Date: 5/3/2024									
3-Phase Short-Circuit									
Fault Locations with Feeders -- Complete Report --									
Short-Circuit Calculation / Method : ANSI									
Pre-fault Voltage 1.00 p.u.									
Consider Transformer Taps No									
Currents/Voltages for LV/Interrupting									
Grid: Nine_Bus System Stage: Nine_Bus Annex: / 1									
Rated Voltage [kV]									
Equivalent Impedance R[Ωm] X[Ωm]									
Symmetrical Current (E/Z) [kA]									
Apparent Power [MVA]									
X/R ratio									
Asym.RMS X/R based [kA]									
Asym.Pk X/R based [kA]									
Bus 1 16.50									
Mom.Duty	0.006	0.186	51.316	-88.16	1466.538	39.731	84.436	139.625	Sym.Base [kA]
Int.Duty	0.006	0.186	51.316	-88.16	1466.538	39.731			Tot.Base [kA]
30-cycle	0.009	0.267	35.669	-88.14	1019.384				
T1	Mom.Duty	8.038	94.86	229.735	11.756	84.436	139.625	2 cycles	56.594 77.689
	Int.Duty	8.038	94.86	229.735	11.756			3 cycles	57.929 69.338
	30-cycle	6.817	94.32	194.811				5 cycles	57.067 61.881
								8 cycles	57.178 56.951
G1	Mom.Duty	43.291	-88.72	1237.193	44.893	84.436	139.625	2 cycles	56.594 77.689
	Int.Duty	43.291	-88.72	1237.193	44.893			3 cycles	57.929 69.338
	30-cycle	28.860	-88.72	824.795				5 cycles	57.067 61.881
								8 cycles	57.178 56.951
Bus 2 18.00	Mom.Duty	12.669	94.28	394.988	13.372	19.143	32.268	Sym.Base [kA]	
	Int.Duty	12.669	94.28	394.988	13.372			2 cycles	12.669 16.812
	30-cycle	11.414	94.03	355.868				3 cycles	12.669 14.563
T2	Mom.Duty	12.669	94.28	394.988	13.372	19.143	32.268	5 cycles	12.669 13.392
	Int.Duty	12.669	94.28	394.988	13.372			8 cycles	13.063 12.867
	30-cycle	11.414	94.03	355.868				2 cycles	12.669 16.812
								3 cycles	12.669 14.563

	[kV]	R[Ω]	X[Ω]	[kA]	[deg]	[MVA]	[kA]	[kA]	
Bus 3	13.80								
Mom.Duty	0.009	0.207	38.366	-87.41	917.047	34.423	62.648	103.764	Sym.Base [kA] [KA]
Int.Duty	0.009	0.207	38.366	-87.41	917.047	34.423		2 cycles 41.761	57.691
30-cycle	0.013	0.281	28.281	-87.26	675.969			3 cycles 42.862	51.139
								5 cycles 42.095	45.651
								8 cycles 42.486	42.259
T3									
Mom.Duty	11.621	95.61	277.761	10.175		62.648	103.764		
Int.Duty	11.621	95.61	277.761	10.175			2 cycles 41.761	57.691	
30-cycle	10.451	95.18	249.793				3 cycles 42.862	51.139	
								5 cycles 42.095	45.651
								8 cycles 42.486	42.259
G3									
Mom.Duty	26.769	-88.72	639.041	44.893		62.648	103.764		
Int.Duty	26.769	-88.72	639.041	44.893			2 cycles 41.761	57.691	
30-cycle	17.846	-88.72	426.561				3 cycles 42.862	51.139	
								5 cycles 42.095	45.651
								8 cycles 42.486	42.259
Bus 4	230.00								
Mom.Duty	2.256	53.572	2.477	-87.59	986.580	34.638	4.045	6.701	Sym.Base [kA] [KA]
Int.Duty	2.256	53.572	2.477	-87.59	986.580	34.638		2 cycles 2.664	3.699
30-cycle	2.682	67.918	1.954	-87.74	778.271			3 cycles 2.705	3.238
								5 cycles 2.641	2.856
								8 cycles 2.631	2.627
T1									
Mom.Duty	1.813	91.32	722.397	43.392		4.045	6.701		
Int.Duty	1.813	91.32	722.397	43.392			2 cycles 2.664	3.699	
30-cycle	1.404	91.31	559.152				3 cycles 2.705	3.238	
								5 cycles 2.641	2.856
								8 cycles 2.631	2.627
Line 1									
Mom.Duty	0.258	93.19	102.617	17.926		4.045	6.701		
Int.Duty	0.258	93.19	102.617	17.926			2 cycles 2.664	3.699	
30-cycle	0.214	92.49	85.062				3 cycles 2.705	3.238	
								5 cycles 2.641	2.856
								8 cycles 2.631	2.627
Line 6									
Mom.Duty	0.407	96.70	162.178	8.407		4.045	6.701		
Int.Duty	0.407	96.70	162.178	8.407			2 cycles 2.664	3.699	
30-cycle	0.337	96.08	134.433				3 cycles 2.705	3.238	
								5 cycles 2.641	2.856
								8 cycles 2.631	2.627
Bus 5	230.00								
Mom.Duty	5.962	82.475	1.606	-85.87	639.739	14.586	2.435	4.102	Sym.Base [kA] [KA]
Int.Duty	5.962	82.475	1.606	-85.87	639.739	14.586		2 cycles 1.606	2.143
30-cycle	6.284	96.162	1.372	-86.20	546.676			3 cycles 1.606	1.858
								5 cycles 1.606	1.707
								8 cycles 1.663	1.637

	[kV]	R[Ω]	X[Ω]	[kA]	[deg]	[MVA]	[kA]	[kA]	
Line 1									
Mom.Duty	1.201	93.73	478.263	15.340		2.435	4.102		
Int.Duty	1.201	93.73	478.263	15.340			2 cycles 1.606	2.143	
30-cycle	1.025	93.37	408.335				3 cycles 1.606	1.858	
								5 cycles 1.606	1.707
								8 cycles 1.663	1.637
Line 2									
Mom.Duty	0.405	95.33	161.523	10.712		2.435	4.102		
Int.Duty	0.405	95.33	161.523	10.712			2 cycles 1.606	2.143	
30-cycle	0.347	94.78	138.372				3 cycles 1.606	1.858	
								5 cycles 1.606	1.707
								8 cycles 1.663	1.637
Bus 6	230.00								
Mom.Duty	7.427	76.214	1.734	-84.43	690.830	10.405	2.509	4.266	Sym.Base [kA] [KA]
Int.Duty	7.427	76.214	1.734	-84.43	690.830	10.405		2 cycles 1.734	2.156
30-cycle	7.725	90.374	1.464	-85.11	583.221			3 cycles 1.734	1.858
								5 cycles 1.734	1.749
								8 cycles 1.734	1.734
Line 5									
Mom.Duty	0.637	96.67	253.752	8.550		2.509	4.266		
Int.Duty	0.637	96.67	253.752	8.550			2 cycles 1.734	2.156	
30-cycle	0.531	95.87	211.724				3 cycles 1.734	1.858	
								5 cycles 1.734	1.749
								8 cycles 1.734	1.734
Line 6									
Mom.Duty	1.097	94.92	437.152	11.606		2.509	4.266		
Int.Duty	1.097	94.92	437.152	11.606			2 cycles 1.734	2.156	
30-cycle	0.933	94.32	371.547				3 cycles 1.734	1.858	
								5 cycles 1.734	1.749
								8 cycles 1.734	1.734
Bus 7	230.00								
Mom.Duty	9.143	100.503	1.316	-84.80	524.186	11.700	1.938	3.284	Sym.Base [kA] [KA]
Int.Duty	9.143	100.503	1.316	-84.80	524.186	11.700		2 cycles 1.316	1.679
30-cycle	9.602	115.231	1.148	-85.24	457.491			3 cycles 1.316	1.450
								5 cycles 1.316	1.353
								8 cycles 1.323	1.316
Line 2									
Mom.Duty	0.610	96.41	242.861	8.897		1.938	3.284		
Int.Duty	0.610	96.41	242.861	8.897			2 cycles 1.316	1.679	
30-cycle	0.541	95.87	215.697				3 cycles 1.316	1.450	
								5 cycles 1.316	1.353
								8 cycles 1.323	1.316
T2									
Mom.Duty	0.000	0.00	0.000	0.000		1.938	3.284		
Int.Duty	0.000	0.00	0.000	0.000			2 cycles 1.316	1.679	
30-cycle	0.000	0.00	0.000	0.000			3 cycles 1.316	1.450	
								5 cycles 1.316	1.353
								8 cycles 1.323	1.316

Дараагийн стандарт Complete

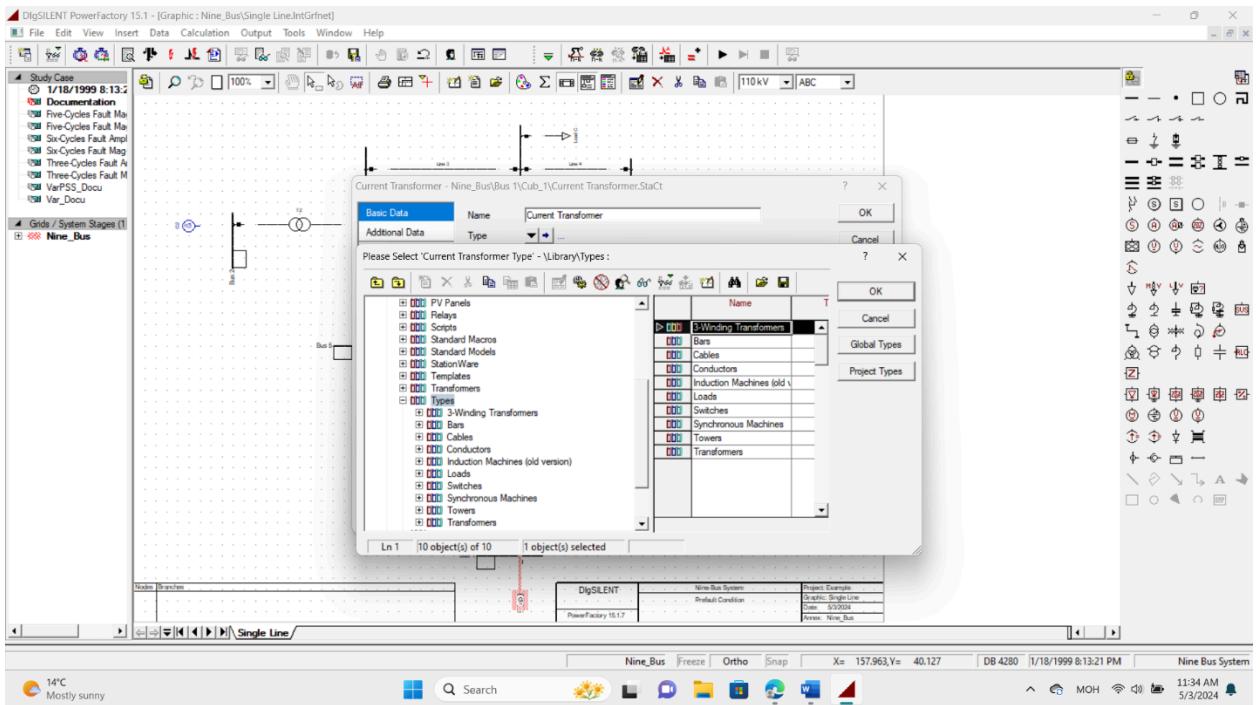


Үр дүн

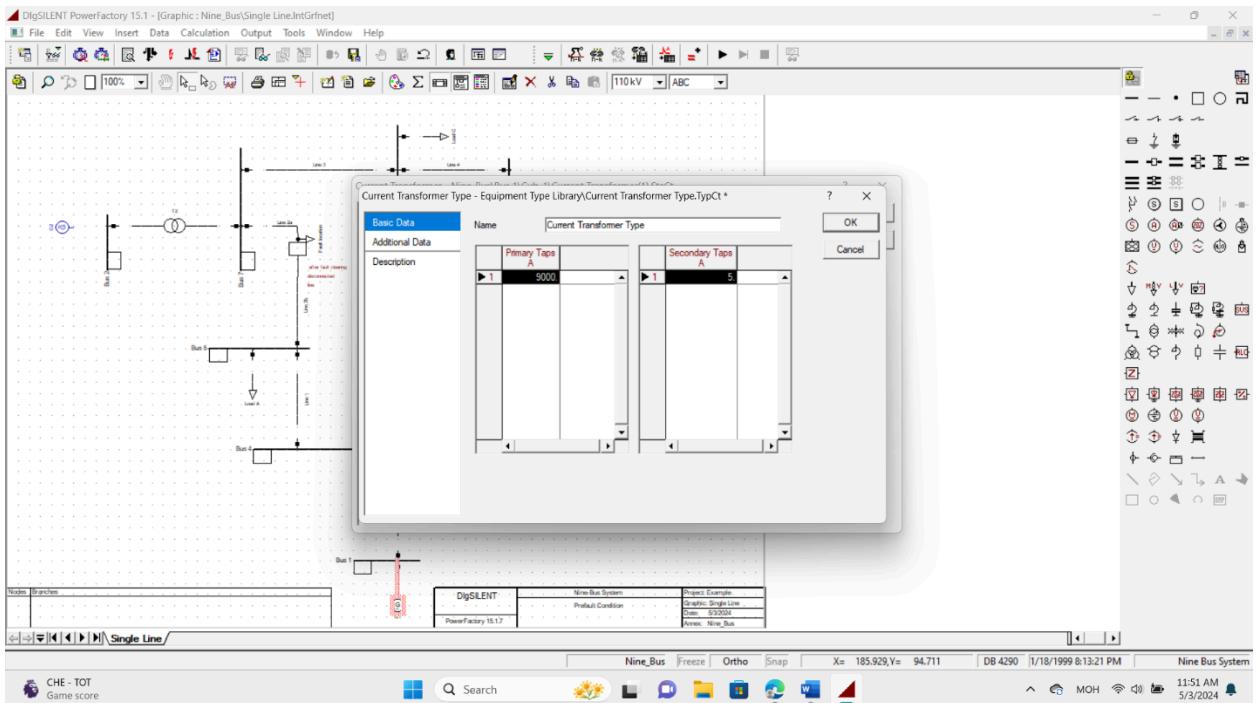
Grid: Nine_Bus System Stage: Nine_Bus Annex: / 1										
	rtd.V.	Voltage	c-	S ^k *	I ^k *	I ^{k'}	i _p	I ^b	i _b	I th
	[kV]	[kV]	[deg]	Factor [MVA/MVA]	[kA/kA]	[deg]	[kA]	[deg]	[kA]	[kA]
Bus 1	16.50	0.00	0.00	1.00	2846.28 MVA	99.59	-86.5	69.29	-84.9	279.33 kA
T1					230.83 MVA	8.08 kA	76.9	7.68	77.4	22.65 kA
G1					2625.83 MVA	91.88 kA	-85.1	62.02	-82.7	257.69 kA
Bus 2	18.00	0.00	0.00	1.00	429.99 MVA	13.79 kA	-93.8	13.27	-92.8	35.57 kA
T2					429.99 MVA	13.79 kA	86.2	13.27	87.2	35.57 kA
Bus 3	13.80	0.00	0.00	1.00	981.86 MVA	41.08 kA	-92.2	36.85	-91.1	111.26 kA
T3					321.04 MVA	13.43 kA	87.4	12.75	88.7	36.38 kA
G3					660.83 MVA	27.65 kA	-92.0	12.10	-91.0	74.89 kA
Bus 4	230.00	0.00	0.00	1.00	1347.36 MVA	3.35 kA	62.6	2.91	64.4	9.35 kA
T1					108.55 MVA	0.72 kA	-116.1	0.29	-112.7	7.57 kA
Line 1					103.42 MVA	0.26 kA	-132.6	0.25	-132.0	0.72 kA
Line 6					166.68 MVA	0.42 kA	-122.9	0.39	-122.3	1.16 kA
Bus 5	230.00	0.00	0.00	1.00	771.64 MVA	1.94 kA	63.2	1.79	64.6	5.01 kA
Line 1					597.34 MVA	1.50 kA	-114.8	1.38	-113.2	3.88 kA
Line 2					175.99 MVA	0.44 kA	-123.8	0.42	-123.0	1.14 kA
Load A					0.00 MVA	0.00 kA	0.0	0.00	0.0	0.00 kA
Bus 6	230.00	0.00	0.00	1.00	814.39 MVA	2.04 kA	64.1	1.89	65.2	5.09 kA
Line 5					271.76 MVA	0.68 kA	-119.9	0.64	-119.2	1.70 kA
Line 6					543.62 MVA	1.36 kA	-113.9	1.25	-112.5	3.40 kA
Load B					0.00 MVA	0.00 kA	0	0.00	0.0	0.00 kA
Bus 7	230.00	0.00	0.00	1.00	579.39 MVA	1.45 kA	60.5	1.38	61.6	3.44 kA
Line 2					277.26 MVA	0.70 kA	-117.0	0.66	-115.7	1.74 kA
T2					0.00 MVA	0.00 kA	0.0	0.00	0.0	0.00 kA
Line 3					302.65 MVA	0.76 kA	-121.8	0.72	-120.8	1.90 kA
Bus 8	230.00	0.00	0.00	1.00	629.07 MVA	1.58 kA	61.3	1.49	62.5	4.01 kA

Grid: Nine_Bus System Stage: Nine_Bus Annex: / 2										
	rtd.V.	Voltage	c-	S ^k *	I ^k *	I ^{k'}	i _p	I ^b	i _b	I th
	[kV]	[kV]	[deg]	Factor [MVA/MVA]	[kA/kA]	[deg]	[kA]	[deg]	[kA]	[kA]

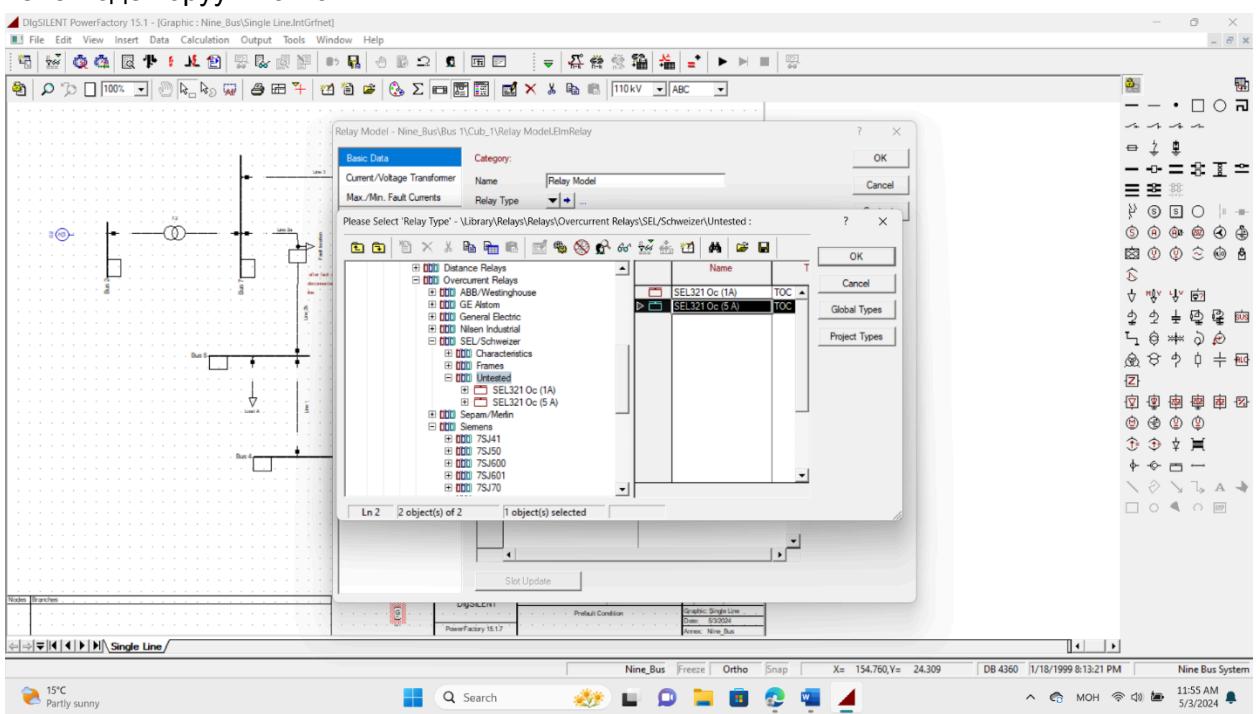
Дараа нь дурын нэг генератороо сонгон авч гүйдлийн трансформатор байрлуулж өгнө.

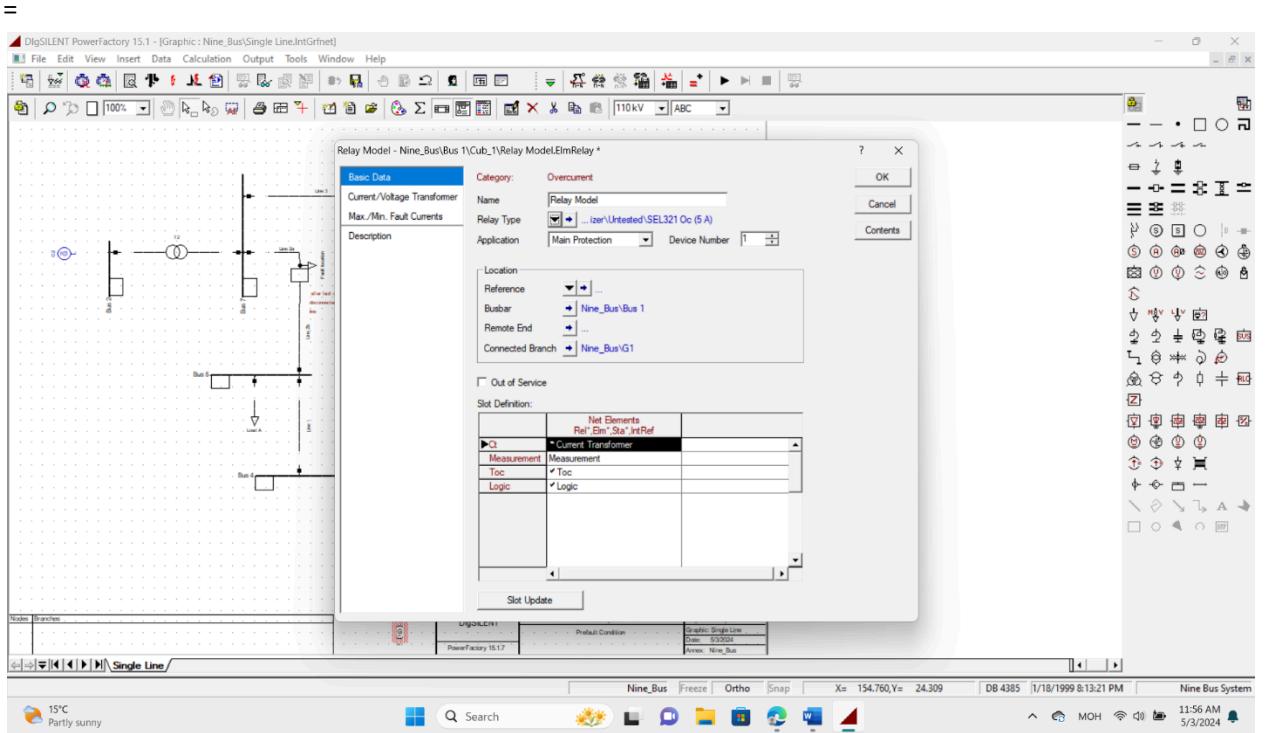


Relays – дараад CTs дээр дарна. Реле моделын

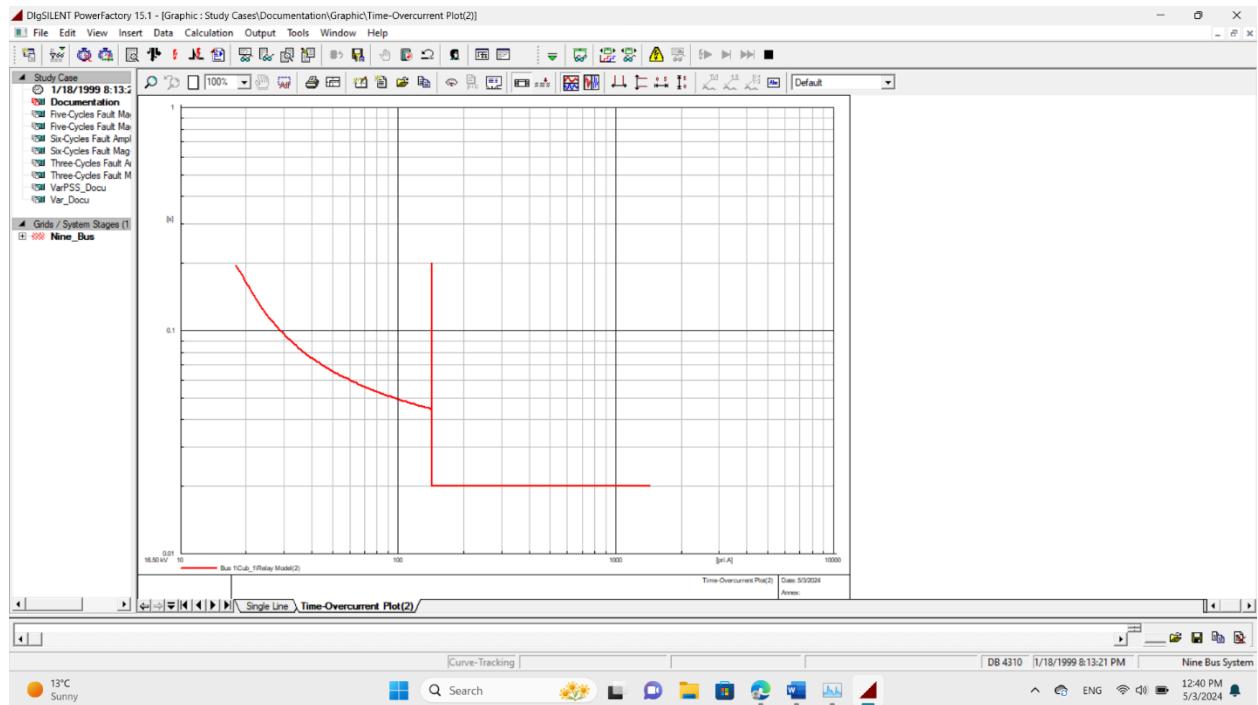


Реле модел оруулж өгнө.



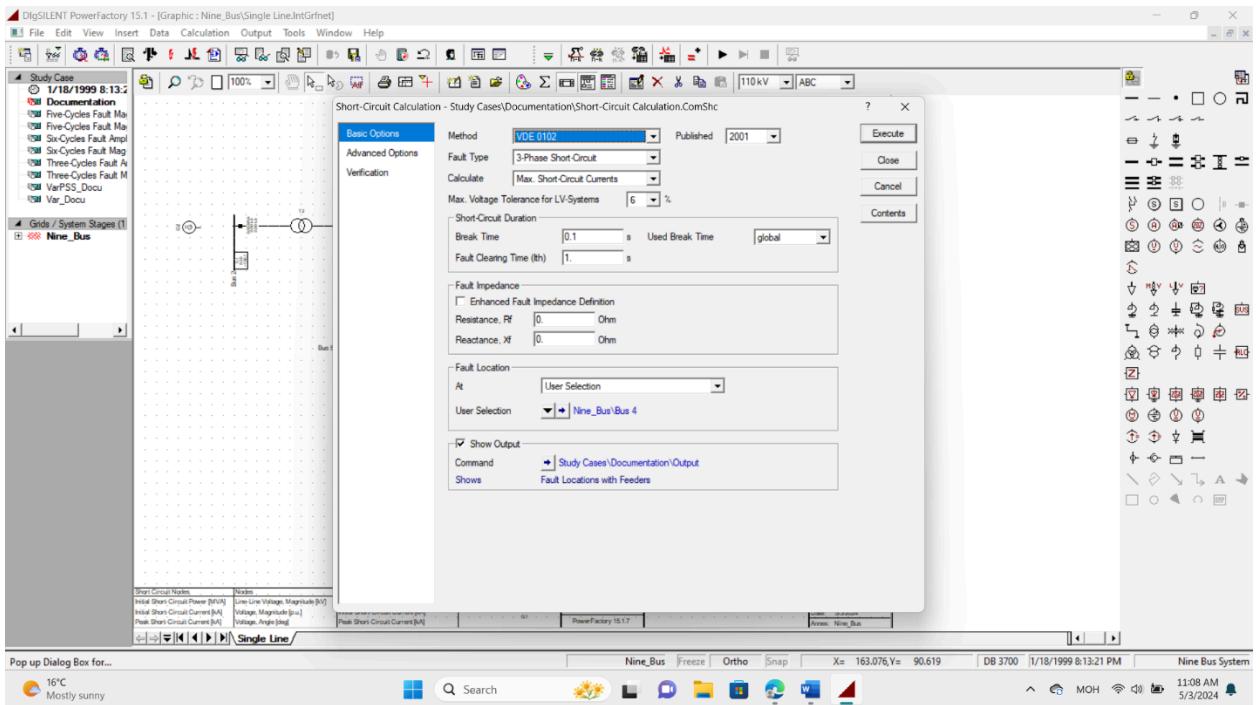


Графикин үр дүн



Зайн хамгаалалт

Дараа нь өөрийн сонгож авсан шин дээр short-circuit хийж съандарт болгон дээр харуулж өгнө. Эхний стандарт



VDE 0102 стандартын дагуу хийсэн байдал Хүнэгтэлж харуулсан нь

