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LAMPIRAN

1. Tegangan Sistem Distribusi Radial IEEE 33 Bus skenario 1

Bus	Tanpa DG	Single DG	2 DG	3 DG	4 DG	5 DG
1	1	1	1	1	1	1
2	0.997	0.9987	0.9984	0.9989	0.9991	0.9988
3	0.983	0.9932	0.9913	0.9949	0.9962	0.9944
4	0.9755	0.9922	0.9891	0.9925	0.994	0.9925
5	0.9682	0.9915	0.9871	0.9903	0.9922	0.991
6	0.9498	0.9878	0.9807	0.9833	0.986	0.9854
7	0.9463	0.9843	0.9784	0.981	0.9845	0.9828
8	0.9415	0.9796	0.9777	0.9801	0.9838	0.9811
9	0.9352	0.9736	0.9774	0.9795	0.9835	0.9794
10	0.9294	0.968	0.9776	0.9795	0.9836	0.9781
11	0.9286	0.9672	0.9779	0.9797	0.9828	0.9781
12	0.9271	0.9657	0.9785	0.9802	0.9814	0.9782
13	0.921	0.9598	0.9808	0.9822	0.9756	0.9784
14	0.9187	0.9576	0.9786	0.983	0.9734	0.9762
15	0.9173	0.9562	0.9773	0.9816	0.972	0.9748
16	0.916	0.9549	0.976	0.9803	0.9707	0.9735
17	0.914	0.9529	0.974	0.9784	0.9687	0.9716
18	0.9134	0.9523	0.9734	0.9778	0.9682	0.971
19	0.9965	0.9981	0.9978	0.9984	0.9986	0.9983
20	0.9929	0.9946	0.9943	0.9948	0.995	0.9947
21	0.9922	0.9939	0.9936	0.9941	0.9943	0.994
22	0.9916	0.9932	0.9929	0.9935	0.9937	0.9934
23	0.9794	0.9897	0.9878	0.9944	0.9962	0.9927
24	0.9727	0.9831	0.9811	0.9939	0.9968	0.9897
25	0.9694	0.9798	0.9778	0.9906	0.9935	0.9901
26	0.9479	0.9859	0.9805	0.9831	0.985	0.9845
27	0.9453	0.9835	0.9804	0.9828	0.9838	0.9834
28	0.9339	0.9727	0.9782	0.9802	0.9775	0.9774
29	0.9257	0.9649	0.977	0.9788	0.9733	0.9734
30	0.9222	0.9616	0.9778	0.9793	0.9721	0.9724
31	0.918	0.9576	0.9738	0.9753	0.9722	0.9726
32	0.9171	0.9567	0.9729	0.9744	0.9713	0.9717
33	0.9168	0.9564	0.9726	0.9742	0.9711	0.9714

Keterangan : = Mengalami *undervoltage*

2. Tegangan Sistem Distribusi Radial IEEE 33 Bus skenario 2

Bus	Tanpa DG	Single DG	2 DG	3 DG	4 DG	5 DG
1	1	1	1	1	1	1
2	0.9969	0.9986	0.9983	0.9987	0.9992	0.9994
3	0.9821	0.9929	0.9911	0.9937	0.9971	0.9979
4	0.9742	0.9919	0.9889	0.9905	0.9956	0.9956
5	0.9664	0.9912	0.9871	0.9876	0.9945	0.9936
6	0.9471	0.9873	0.9806	0.979	0.9898	0.9869
7	0.9434	0.9836	0.9783	0.9762	0.9883	0.9841
8	0.9383	0.9787	0.9776	0.9745	0.988	0.9822
9	0.9317	0.9724	0.9774	0.9727	0.9884	0.9802
10	0.9256	0.9665	0.9778	0.9714	0.9893	0.9788
11	0.9247	0.9656	0.9781	0.9714	0.9897	0.9787
12	0.9231	0.9641	0.9788	0.9716	0.9905	0.9788
13	0.9167	0.9579	0.9815	0.9719	0.9844	0.9788
14	0.9143	0.9555	0.9792	0.972	0.9821	0.9765
15	0.9129	0.9541	0.9777	0.9706	0.9807	0.9751
16	0.9114	0.9527	0.9764	0.9692	0.9793	0.9737
17	0.9093	0.9506	0.9743	0.9671	0.9773	0.9716
18	0.9087	0.95	0.9737	0.9665	0.9767	0.971
19	0.9963	0.998	0.9978	0.9982	0.9987	0.9988
20	0.9926	0.9943	0.994	0.9944	0.9949	0.9951
21	0.9918	0.9935	0.9933	0.9937	0.9942	0.9943
22	0.9912	0.9929	0.9926	0.993	0.9935	0.9937
23	0.9783	0.9892	0.9874	0.9931	0.9971	0.9996
24	0.9713	0.9823	0.9804	0.9924	0.9975	0.9979
25	0.9678	0.9788	0.977	0.989	0.9941	0.9944
26	0.9451	0.9854	0.9805	0.9786	0.9893	0.987
27	0.9424	0.9829	0.9804	0.9782	0.9886	0.9874
28	0.9304	0.9715	0.9785	0.975	0.9845	0.9838
29	0.9217	0.9633	0.9775	0.9731	0.9819	0.9815
30	0.918	0.9598	0.9785	0.9735	0.9818	0.9817
31	0.9136	0.9555	0.9743	0.9693	0.9841	0.9846
32	0.9126	0.9546	0.9733	0.9684	0.9832	0.9859
33	0.9123	0.9543	0.973	0.9681	0.9829	0.9857

Keterangan : = Mengalami *undervoltage*

3. Tegangan Sistem Distribusi Radial IEEE 33 Bus skenario 3

Bus	Tanpa DG	Single DG	2 DG	3 DG	4 DG	5 DG
1	1	1	1	1	1	1
2	0.9967	0.9986	0.9982	0.9987	0.9987	0.9992
3	0.9812	0.9932	0.9906	0.9938	0.9937	0.9958
4	0.9729	0.9925	0.9883	0.9906	0.9922	0.994
5	0.9647	0.9922	0.9862	0.9877	0.991	0.9925
6	0.9444	0.9891	0.9794	0.9789	0.986	0.9869
7	0.9405	0.9852	0.9769	0.9763	0.9832	0.9841
8	0.9351	0.9801	0.9762	0.9751	0.9813	0.9824
9	0.9282	0.9735	0.976	0.9742	0.9794	0.9808
10	0.9218	0.9673	0.9764	0.9739	0.978	0.9797
11	0.9208	0.9664	0.9768	0.9741	0.978	0.9797
12	0.9191	0.9648	0.9775	0.9745	0.9781	0.9799
13	0.9124	0.9583	0.9803	0.9763	0.9784	0.9806
14	0.9099	0.9558	0.9779	0.977	0.9785	0.9808
15	0.9083	0.9543	0.9764	0.9755	0.977	0.9822
16	0.9068	0.9528	0.9749	0.9741	0.9756	0.9844
17	0.9046	0.9506	0.9728	0.9719	0.9734	0.9822
18	0.9039	0.95	0.9721	0.9713	0.9728	0.9815
19	0.9961	0.998	0.9976	0.9981	0.9981	0.9986
20	0.9922	0.9941	0.9937	0.9942	0.9942	0.9947
21	0.9914	0.9933	0.9929	0.9934	0.9934	0.9939
22	0.9907	0.9926	0.9922	0.9927	0.9927	0.9932
23	0.9772	0.9893	0.9867	0.9934	0.9911	0.9951
24	0.9698	0.982	0.9794	0.993	0.9866	0.9943
25	0.9662	0.9784	0.9758	0.9894	0.983	0.9907
26	0.9422	0.9871	0.9792	0.9784	0.9852	0.986
27	0.9394	0.9845	0.9791	0.9779	0.9841	0.9849
28	0.9267	0.9725	0.9769	0.9739	0.9783	0.9787
29	0.9177	0.964	0.9758	0.9714	0.9745	0.9746
30	0.9137	0.9604	0.9768	0.9715	0.9737	0.9737
31	0.9091	0.9559	0.9723	0.967	0.9748	0.9746
32	0.9081	0.9549	0.9714	0.9661	0.9757	0.9753
33	0.9078	0.9546	0.9711	0.9657	0.9754	0.975

Keterangan : = Mengalami *undervoltage*

4. Tegangan Sistem Distribusi Radial IEEE 33 Bus skenario 4

Bus	Tanpa DG	Single DG	2 DG	3 DG	4 DG	5 DG
1	1	1	1	1	1	1
2	0.9966	0.9985	0.9981	0.9988	0.9991	0.999
3	0.9802	0.9924	0.9902	0.9944	0.9962	0.9956
4	0.9716	0.9913	0.9878	0.992	0.9939	0.9935
5	0.963	0.9907	0.9857	0.9899	0.9921	0.9918
6	0.9416	0.9867	0.9785	0.9829	0.9855	0.9854
7	0.9376	0.9869	0.9759	0.9802	0.9828	0.9824
8	0.9319	0.9816	0.9753	0.9793	0.9819	0.9805
9	0.9246	0.9746	0.9752	0.9788	0.9816	0.9786
10	0.9179	0.9682	0.9757	0.979	0.9818	0.9772
11	0.9169	0.9672	0.9761	0.9793	0.9821	0.9772
12	0.9151	0.9656	0.9769	0.9799	0.9805	0.9774
13	0.908	0.9587	0.98	0.9825	0.9738	0.9777
14	0.9054	0.9561	0.9774	0.9835	0.9712	0.9779
15	0.9038	0.9545	0.9759	0.9819	0.9696	0.9764
16	0.9022	0.953	0.9743	0.9804	0.9681	0.9748
17	0.8998	0.9507	0.9721	0.9781	0.9658	0.9726
18	0.8991	0.95	0.9714	0.9775	0.9652	0.9719
19	0.996	0.9979	0.9975	0.9982	0.9985	0.9984
20	0.9918	0.9938	0.9934	0.9941	0.9944	0.9943
21	0.991	0.993	0.9926	0.9933	0.9935	0.9935
22	0.9903	0.9922	0.9919	0.9925	0.9928	0.9927
23	0.9761	0.9883	0.9861	0.9936	0.9964	0.9953
24	0.9684	0.9807	0.9785	0.9924	0.9975	0.9953
25	0.9645	0.9769	0.9747	0.9887	0.9938	0.999
26	0.9394	0.9846	0.9783	0.9828	0.9854	0.9841
27	0.9364	0.9818	0.9782	0.9827	0.9855	0.9823
28	0.9231	0.9693	0.9759	0.9809	0.9793	0.9736
29	0.9136	0.9603	0.9747	0.98	0.9752	0.9675
30	0.9094	0.9565	0.9757	0.9812	0.9743	0.9655
31	0.9046	0.9518	0.971	0.9766	0.9754	0.9642
32	0.9035	0.9508	0.97	0.9755	0.9762	0.9632
33	0.9032	0.9505	0.9697	0.9752	0.978	0.9629

Keterangan : = Mengalami *undervoltage*

5. Tegangan Sistem Distribusi Radial IEEE 33 Bus skenario 5

Bus	Tanpa DG	Single DG	2 DG	3 DG	4 DG	5 DG
1	1	1	1	1	1	1
2	0.9964	0.9985	0.9981	0.9986	0.9989	0.9993
3	0.9793	0.9926	0.9898	0.9933	0.9949	0.9942
4	0.9702	0.9918	0.9873	0.99	0.9925	0.9921
5	0.9612	0.9914	0.9852	0.987	0.9904	0.9904
6	0.9388	0.988	0.9778	0.9779	0.9832	0.9841
7	0.9346	0.9886	0.9751	0.975	0.9813	0.9824
8	0.9287	0.983	0.9744	0.9738	0.9831	0.9802
9	0.921	0.9757	0.9742	0.973	0.9823	0.9778
10	0.9139	0.969	0.9748	0.9727	0.9821	0.976
11	0.9129	0.968	0.9751	0.9729	0.9823	0.9759
12	0.9111	0.9663	0.9759	0.9735	0.9829	0.9759
13	0.9036	0.9591	0.9791	0.9756	0.9851	0.9758
14	0.9009	0.9564	0.9764	0.973	0.9824	0.9758
15	0.8991	0.9547	0.9748	0.9713	0.9808	0.977
16	0.8975	0.9531	0.9732	0.9697	0.9792	0.9754
17	0.895	0.9507	0.9708	0.9673	0.9768	0.973
18	0.8943	0.95	0.9701	0.9666	0.9761	0.9723
19	0.9958	0.9979	0.9974	0.998	0.9982	0.9987
20	0.9915	0.9936	0.9931	0.9937	0.9939	0.9944
21	0.9906	0.9927	0.9923	0.9928	0.9931	0.9935
22	0.9899	0.992	0.9915	0.9921	0.9923	0.9928
23	0.975	0.9883	0.9855	0.9926	0.9944	0.9922
24	0.9669	0.9803	0.9776	0.9919	0.9941	0.9888
25	0.9629	0.9764	0.9736	0.9879	0.9902	0.9894
26	0.9365	0.9859	0.9777	0.9774	0.9824	0.9832
27	0.9334	0.983	0.9776	0.977	0.9813	0.9822
28	0.9194	0.9699	0.9753	0.9731	0.9753	0.9761
29	0.9094	0.9606	0.9742	0.9708	0.9714	0.9721
30	0.9051	0.9566	0.9754	0.9711	0.9707	0.9714
31	0.9	0.9517	0.9705	0.9663	0.9723	0.9729
32	0.8989	0.9506	0.9694	0.9652	0.9712	0.9739
33	0.8985	0.9503	0.9691	0.9648	0.9709	0.9759

Keterangan : = Mengalami *undervoltage*

6. Tegangan Sistem Distribusi Radial IEEE 33 Bus skenario 6

Bus	Tanpa DG	Single DG	2 DG	3 DG	4 DG	5 DG
1	1	1	1	1	1	1
2	0.9966	0.9986	0.9982	0.9987	0.9988	0.9988
3	0.9804	0.993	0.9908	0.9938	0.9942	0.9945
4	0.9717	0.9921	0.9885	0.9905	0.992	0.9922
5	0.9631	0.9917	0.9867	0.9876	0.9901	0.9903
6	0.9418	0.9883	0.9802	0.9786	0.9836	0.9837
7	0.9376	0.9885	0.9771	0.9758	0.9808	0.9817
8	0.9317	0.983	0.9752	0.9747	0.98	0.9834
9	0.9241	0.9757	0.9733	0.9742	0.9797	0.9801
10	0.917	0.969	0.972	0.9743	0.9801	0.9774
11	0.916	0.968	0.972	0.9745	0.9804	0.9771
12	0.9141	0.9663	0.9722	0.9752	0.9811	0.9768
13	0.9067	0.9591	0.9728	0.9777	0.9841	0.9753
14	0.904	0.9564	0.9731	0.9787	0.9814	0.9748
15	0.9023	0.9547	0.9746	0.9771	0.9798	0.9754
16	0.9006	0.9531	0.973	0.9755	0.9782	0.9739
17	0.8982	0.9507	0.9706	0.9731	0.9758	0.9715
18	0.8974	0.95	0.9699	0.9725	0.9752	0.9708
19	0.996	0.998	0.9976	0.9981	0.9982	0.9982
20	0.9921	0.9941	0.9937	0.9942	0.9943	0.9943
21	0.9913	0.9933	0.9929	0.9934	0.9935	0.9935
22	0.9906	0.9926	0.9922	0.9927	0.9928	0.9928
23	0.9764	0.989	0.9868	0.9936	0.993	0.9936
24	0.9691	0.9818	0.9795	0.9937	0.991	0.9923
25	0.9654	0.9781	0.9759	0.9901	0.9927	0.9946
26	0.9397	0.9863	0.9805	0.978	0.9835	0.9829
27	0.9368	0.9837	0.9811	0.9774	0.9837	0.982
28	0.9241	0.9717	0.9816	0.9733	0.9797	0.9766
29	0.915	0.9632	0.9826	0.9707	0.9772	0.9731
30	0.9111	0.9596	0.9849	0.9708	0.9773	0.9723
31	0.9064	0.9551	0.9805	0.9663	0.9728	0.9733
32	0.9054	0.9541	0.9795	0.9653	0.9719	0.9741
33	0.9051	0.9538	0.9792	0.965	0.9715	0.9738

Keterangan : = Mengalami *undervoltage*

7. Tegangan Sistem Distribusi Radial 69 Bus skenario 1

Bus	Tanpa DG	Single DG	2 DG	3 DG	4 DG	5 DG
1	1	1	1	1	1	1
2	1	1	1	1	1	1
3	0.9999	0.9999	1	1	1	1
4	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999
5	0.9992	0.9994	0.9995	0.9995	0.9996	0.9996
6	0.993	0.9958	0.9969	0.9973	0.9974	0.9973
7	0.9865	0.9921	0.9943	0.995	0.9952	0.9951
8	0.985	0.9913	0.9937	0.9945	0.9947	0.9945
9	0.9749	0.9883	0.9935	0.9954	0.9958	0.9954
10	0.9649	0.9785	0.9908	0.9953	0.996	0.9953
11	0.9638	0.9774	0.9905	0.9952	0.9954	0.9952
12	0.9606	0.9743	0.9902	0.9941	0.9941	0.9941
13	0.9576	0.9713	0.9913	0.9941	0.9938	0.9941
14	0.9547	0.9684	0.9925	0.9941	0.9935	0.9941
15	0.9517	0.9655	0.9937	0.9942	0.9933	0.9942
16	0.9512	0.965	0.994	0.9942	0.9933	0.9942
17	0.9503	0.9641	0.9946	0.9944	0.9933	0.9944
18	0.9503	0.9641	0.9946	0.9944	0.9933	0.9944
19	0.9498	0.9637	0.9942	0.994	0.9929	0.994
20	0.9496	0.9634	0.9939	0.9937	0.9926	0.9937
21	0.9491	0.963	0.9935	0.9933	0.9922	0.9933
22	0.9491	0.963	0.9935	0.9933	0.9922	0.9933
23	0.9491	0.9629	0.9934	0.9933	0.9922	0.9933
24	0.949	0.9628	0.9933	0.9932	0.9921	0.9932
25	0.9489	0.9627	0.9932	0.9931	0.992	0.9931
26	0.9488	0.9627	0.9932	0.993	0.992	0.993
27	0.9488	0.9627	0.9932	0.993	0.992	0.993
28	0.9999	0.9999	0.9999	0.9999	0.9999	1
29	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999
30	0.9997	0.9998	0.9998	0.9998	0.9998	0.9998
31	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997
32	0.9996	0.9996	0.9996	0.9996	0.9996	0.9996
33	0.9994	0.9994	0.9994	0.9994	0.9994	0.9994
34	0.999	0.999	0.999	0.999	0.999	0.9991
35	0.999	0.999	0.999	0.999	0.999	0.999
36	0.9978	0.9978	0.9979	0.9979	0.9979	0.9979
37	0.9977	0.9977	0.9977	0.9977	0.9977	0.9977
38	0.9975	0.9975	0.9975	0.9975	0.9975	0.9975

39	0.9975	0.9975	0.9975	0.9975	0.9975	0.9975
40	0.9975	0.9975	0.9975	0.9975	0.9975	0.9975
41	0.9968	0.9968	0.9968	0.9968	0.9968	0.9968
42	0.9965	0.9965	0.9965	0.9965	0.9965	0.9965
43	0.9964	0.9964	0.9964	0.9964	0.9965	0.9965
44	0.9964	0.9964	0.9964	0.9964	0.9964	0.9964
45	0.9963	0.9963	0.9963	0.9963	0.9963	0.9963
46	0.9963	0.9963	0.9963	0.9963	0.9963	0.9963
47	0.9998	0.9998	0.9998	0.9998	0.9999	0.9999
48	0.9986	0.9986	0.9986	0.9986	0.9988	0.999
49	0.9947	0.9948	0.9948	0.9948	0.9958	0.9965
50	0.9942	0.9942	0.9942	0.9942	0.9955	0.9963
51	0.985	0.9912	0.9936	0.9945	0.9947	0.9945
52	0.985	0.9912	0.9936	0.9945	0.9946	0.9945
53	0.9734	0.9881	0.9931	0.9949	0.9952	0.9949
54	0.9717	0.9878	0.9926	0.9943	0.9946	0.9943
55	0.9694	0.9876	0.9919	0.9935	0.9939	0.9936
56	0.9671	0.9874	0.9914	0.9929	0.9932	0.9929
57	0.9569	0.9883	0.9903	0.9911	0.9914	0.9911
58	0.9518	0.9888	0.9898	0.9903	0.9905	0.9903
59	0.9499	0.989	0.9897	0.99	0.9902	0.99
60	0.9479	0.9897	0.9899	0.99	0.9902	0.99
61	0.9444	0.9898	0.9894	0.9893	0.9895	0.9893
62	0.9441	0.9896	0.9891	0.989	0.9897	0.989
63	0.9437	0.9892	0.9888	0.9887	0.9894	0.9887
64	0.9419	0.9875	0.9871	0.987	0.9877	0.987
65	0.9414	0.987	0.9865	0.9864	0.9872	0.9864
66	0.9637	0.9774	0.9904	0.9957	0.9954	0.9957
67	0.9637	0.9774	0.9904	0.9957	0.9954	0.9957
68	0.9603	0.974	0.9899	0.9938	0.9938	0.9938
69	0.9603	0.974	0.9899	0.9938	0.9938	0.9938

Keterangan = Mengalami *Undervoltage*

8. Tegangan Sistem Distribusi Radial IEEE 69 Bus skenario 2

Bus	Tanpa DG	Single DG	2 DG	3 DG	4 DG	5 DG
1	1	1	1	1	1	1
2	1	1	1	1	1	1
3	0.9999	0.9999	0.9999	0.9999	1	1
4	0.9998	0.9999	0.9999	0.9999	0.9999	0.9999
5	0.9992	0.9994	0.9995	0.9995	0.9995	0.9996
6	0.9926	0.9957	0.9968	0.9968	0.9968	0.9977
7	0.9858	0.9918	0.994	0.994	0.9941	0.9958
8	0.9842	0.9909	0.9934	0.9934	0.9935	0.9953
9	0.9736	0.9878	0.9933	0.9934	0.9935	0.9975
10	0.9631	0.9775	0.9905	0.9924	0.9928	0.9974
11	0.962	0.9764	0.9902	0.9922	0.9926	0.9973
12	0.9586	0.9731	0.9898	0.9926	0.9919	0.9961
13	0.9555	0.97	0.991	0.9923	0.9925	0.9961
14	0.9524	0.967	0.9923	0.9921	0.9931	0.9962
15	0.9493	0.9639	0.9936	0.9919	0.9939	0.9963
16	0.9487	0.9634	0.9939	0.9919	0.994	0.9963
17	0.9478	0.9624	0.9945	0.9919	0.9931	0.9965
18	0.9477	0.9624	0.9945	0.9919	0.9931	0.9965
19	0.9473	0.962	0.9941	0.9915	0.9927	0.996
20	0.947	0.9617	0.9938	0.9912	0.9924	0.9958
21	0.9466	0.9612	0.9933	0.9908	0.992	0.9953
22	0.9465	0.9612	0.9933	0.9908	0.992	0.9953
23	0.9465	0.9612	0.9933	0.9907	0.9919	0.9953
24	0.9464	0.9611	0.9932	0.9906	0.9918	0.9952
25	0.9463	0.961	0.9931	0.9905	0.9917	0.9951
26	0.9462	0.9609	0.9931	0.9905	0.9917	0.995
27	0.9462	0.9609	0.9931	0.9905	0.9917	0.995
28	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999
29	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999
30	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997
31	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997
32	0.9996	0.9996	0.9996	0.9996	0.9996	0.9996
33	0.9993	0.9993	0.9993	0.9993	0.9993	0.9993
34	0.999	0.999	0.999	0.999	0.999	0.999
35	0.9989	0.9989	0.9989	0.9989	0.9989	0.9989
36	0.9977	0.9977	0.9977	0.9977	0.9977	0.9978
37	0.9976	0.9976	0.9976	0.9976	0.9976	0.9976
38	0.9974	0.9974	0.9974	0.9974	0.9974	0.9974

39	0.9973	0.9973	0.9973	0.9973	0.9974	0.9974
40	0.9973	0.9973	0.9973	0.9973	0.9974	0.9974
41	0.9966	0.9966	0.9966	0.9966	0.9966	0.9966
42	0.9963	0.9963	0.9963	0.9963	0.9963	0.9963
43	0.9963	0.9963	0.9963	0.9963	0.9963	0.9963
44	0.9962	0.9963	0.9963	0.9963	0.9963	0.9963
45	0.9961	0.9962	0.9962	0.9962	0.9962	0.9962
46	0.9961	0.9962	0.9962	0.9962	0.9962	0.9962
47	0.9998	0.9998	0.9998	0.9998	0.9999	0.9999
48	0.9985	0.9985	0.9985	0.9985	0.999	0.9989
49	0.9945	0.9945	0.9945	0.9945	0.9964	0.996
50	0.9939	0.9939	0.9939	0.9939	0.9962	0.9957
51	0.9842	0.9909	0.9934	0.9934	0.9935	0.9953
52	0.9842	0.9908	0.9934	0.9934	0.9934	0.9953
53	0.9721	0.9876	0.9929	0.9928	0.9929	0.9972
54	0.9703	0.9874	0.9924	0.992	0.9922	0.9968
55	0.9678	0.9871	0.9917	0.9911	0.9912	0.9964
56	0.9655	0.9869	0.9911	0.9903	0.9904	0.996
57	0.9547	0.988	0.9901	0.9877	0.9877	0.9961
58	0.9495	0.9886	0.9897	0.9865	0.9865	0.9962
59	0.9474	0.9888	0.9895	0.986	0.986	0.9963
60	0.9453	0.9896	0.9897	0.9859	0.9858	0.9968
61	0.9416	0.9898	0.9893	0.9849	0.9848	0.9967
62	0.9413	0.9895	0.989	0.9851	0.985	0.9967
63	0.941	0.9892	0.9887	0.9854	0.9847	0.9968
64	0.9391	0.9874	0.9869	0.9836	0.9829	0.9974
65	0.9385	0.9868	0.9863	0.9831	0.9823	0.9969
66	0.9619	0.9763	0.9901	0.9922	0.9929	0.9978
67	0.9619	0.9763	0.9901	0.9922	0.9929	0.9978
68	0.9583	0.9728	0.9895	0.9923	0.9915	0.9958
69	0.9583	0.9728	0.9895	0.9923	0.9915	0.9958

Keterangan = Mengalami *Undervoltage*

9. Tegangan Sistem Distribusi Radial IEEE 69 Bus skenario 3

Bus	Tanpa DG	Single DG	2 DG	3 DG	4 DG	5 DG
1	1	1	1	1	1	1
2	1	1	1	1	1	1
3	0.9999	0.9999	0.9999	0.9999	1	1
4	0.9998	0.9999	0.9999	0.9999	0.9999	0.9999
5	0.9991	0.9994	0.9995	0.9995	0.9995	0.9995
6	0.9923	0.9955	0.9967	0.9971	0.9971	0.9972
7	0.9851	0.9914	0.9938	0.9947	0.9947	0.9949
8	0.9835	0.9905	0.9931	0.9942	0.9941	0.9944
9	0.9723	0.9874	0.9931	0.9954	0.9952	0.9958
10	0.9614	0.9766	0.9902	0.9956	0.9951	0.9964
11	0.9601	0.9754	0.9899	0.9955	0.995	0.9964
12	0.9566	0.9719	0.9895	0.9942	0.9938	0.9952
13	0.9533	0.9687	0.9908	0.9941	0.9938	0.9951
14	0.9501	0.9655	0.9921	0.9941	0.9939	0.9951
15	0.9468	0.9623	0.9935	0.9941	0.994	0.9951
16	0.9462	0.9617	0.9938	0.9941	0.994	0.9951
17	0.9452	0.9607	0.9944	0.9942	0.9942	0.9953
18	0.9452	0.9607	0.9944	0.9942	0.9942	0.9953
19	0.9448	0.9603	0.994	0.9938	0.9938	0.9958
20	0.9445	0.96	0.9937	0.9935	0.9935	0.9961
21	0.944	0.9595	0.9932	0.993	0.9931	0.9967
22	0.944	0.9595	0.9932	0.993	0.993	0.9967
23	0.9439	0.9594	0.9932	0.993	0.993	0.9967
24	0.9438	0.9593	0.9931	0.9929	0.9929	0.9966
25	0.9437	0.9592	0.993	0.9928	0.9928	0.9965
26	0.9436	0.9592	0.9929	0.9927	0.9927	0.9964
27	0.9436	0.9592	0.9929	0.9927	0.9927	0.9964
28	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999
29	0.9998	0.9999	0.9999	0.9999	0.9999	0.9999
30	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997
31	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997
32	0.9996	0.9996	0.9996	0.9996	0.9996	0.9996
33	0.9993	0.9993	0.9993	0.9993	0.9993	0.9993
34	0.9989	0.9989	0.9989	0.9989	0.999	0.999
35	0.9989	0.9989	0.9989	0.9989	0.9989	0.9989
36	0.9976	0.9976	0.9976	0.9976	0.9976	0.9976
37	0.9974	0.9974	0.9974	0.9974	0.9975	0.9975
38	0.9973	0.9973	0.9973	0.9973	0.9973	0.9973

39	0.9972	0.9972	0.9972	0.9972	0.9972	0.9972
40	0.9972	0.9972	0.9972	0.9972	0.9972	0.9972
41	0.9964	0.9965	0.9965	0.9965	0.9965	0.9965
42	0.9961	0.9961	0.9961	0.9961	0.9961	0.9961
43	0.9961	0.9961	0.9961	0.9961	0.9961	0.9961
44	0.9961	0.9961	0.9961	0.9961	0.9961	0.9961
45	0.996	0.996	0.996	0.996	0.996	0.996
46	0.996	0.996	0.996	0.996	0.996	0.996
47	0.9998	0.9998	0.9998	0.9998	0.9999	0.9999
48	0.9984	0.9984	0.9985	0.9985	0.9989	0.9989
49	0.9942	0.9942	0.9942	0.9942	0.9961	0.996
50	0.9936	0.9936	0.9937	0.9937	0.9959	0.9958
51	0.9834	0.9905	0.9931	0.9941	0.9941	0.9943
52	0.9834	0.9905	0.9931	0.9941	0.994	0.9943
53	0.9707	0.9872	0.9927	0.9948	0.9947	0.9952
54	0.9689	0.9869	0.9922	0.9942	0.994	0.9946
55	0.9663	0.9867	0.9915	0.9934	0.9932	0.9938
56	0.9639	0.9865	0.9909	0.9927	0.9925	0.993
57	0.9526	0.9877	0.99	0.9909	0.9908	0.9911
58	0.9471	0.9884	0.9896	0.9901	0.99	0.9903
59	0.945	0.9887	0.9894	0.9898	0.9898	0.99
60	0.9428	0.9895	0.9897	0.9898	0.9898	0.99
61	0.9389	0.9898	0.9892	0.9891	0.9891	0.9892
62	0.9386	0.9895	0.989	0.9888	0.9889	0.9893
63	0.9382	0.9891	0.9886	0.9885	0.9885	0.9894
64	0.9362	0.9873	0.9867	0.9866	0.9866	0.9898
65	0.9356	0.9867	0.9861	0.986	0.986	0.9893
66	0.9601	0.9753	0.9898	0.9955	0.9955	0.9964
67	0.9601	0.9753	0.9898	0.9955	0.9955	0.9964
68	0.9563	0.9716	0.9892	0.9939	0.9935	0.9948
69	0.9563	0.9716	0.9892	0.9939	0.9935	0.9948

Keterangan = Mengalami *Undervoltage*

10. Tegangan Sistem Distribusi Radial IEEE 69 Bus skenario 4

Bus	Tanpa DG	Single DG	2 DG	3 DG	4 DG	5 DG
1	1	1	1	1	1	1
2	1	1	1	1	1	1
3	0.9999	0.9999	0.9999	0.9999	0.9999	1
4	0.9998	0.9999	0.9999	0.9999	0.9999	0.9999
5	0.9991	0.9994	0.9994	0.9995	0.9995	0.9995
6	0.9919	0.9953	0.9966	0.997	0.997	0.9971
7	0.9845	0.9911	0.9936	0.9945	0.9945	0.9946
8	0.9827	0.9901	0.9929	0.994	0.994	0.9941
9	0.9711	0.9869	0.993	0.9953	0.9953	0.9956
10	0.9596	0.9757	0.99	0.9955	0.9954	0.9961
11	0.9583	0.9744	0.9896	0.9955	0.9953	0.996
12	0.9546	0.9708	0.9892	0.9941	0.994	0.9946
13	0.9512	0.9674	0.9905	0.994	0.9938	0.9944
14	0.9478	0.964	0.9919	0.994	0.9937	0.9942
15	0.9444	0.9607	0.9934	0.994	0.9937	0.9941
16	0.9437	0.9601	0.9937	0.994	0.9937	0.9941
17	0.9427	0.9591	0.9944	0.9941	0.9938	0.9942
18	0.9427	0.9591	0.9944	0.9942	0.9938	0.9942
19	0.9422	0.9586	0.9939	0.9937	0.9934	0.9938
20	0.9419	0.9583	0.9936	0.9934	0.9931	0.9935
21	0.9414	0.9578	0.9931	0.9929	0.9926	0.993
22	0.9414	0.9578	0.9931	0.9929	0.9926	0.993
23	0.9413	0.9577	0.9931	0.9929	0.9925	0.9929
24	0.9412	0.9576	0.993	0.9927	0.9924	0.9928
25	0.9411	0.9575	0.9929	0.9926	0.9923	0.9927
26	0.941	0.9574	0.9928	0.9926	0.9923	0.9927
27	0.941	0.9574	0.9928	0.9926	0.9923	0.9927
28	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999
29	0.9998	0.9999	0.9999	0.9999	0.9999	0.9999
30	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997
31	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997
32	0.9996	0.9996	0.9996	0.9996	0.9996	0.9996
33	0.9993	0.9993	0.9993	0.9993	0.9993	0.9993
34	0.9989	0.9989	0.9989	0.9989	0.9989	0.9989
35	0.9988	0.9988	0.9988	0.9988	0.9988	0.9988
36	0.9975	0.9975	0.9975	0.9975	0.9975	0.9991
37	0.9973	0.9973	0.9973	0.9973	0.9973	0.999
38	0.9971	0.9971	0.9971	0.9971	0.9972	0.9989

39	0.9971	0.9971	0.9971	0.9971	0.9971	0.9989
40	0.9971	0.9971	0.9971	0.9971	0.9971	0.9989
41	0.9963	0.9963	0.9963	0.9963	0.9963	0.9988
42	0.9959	0.996	0.996	0.996	0.996	0.9988
43	0.9959	0.9959	0.9959	0.9959	0.9959	0.9988
44	0.9959	0.9959	0.9959	0.9959	0.9959	0.9988
45	0.9958	0.9958	0.9958	0.9958	0.9958	0.9987
46	0.9958	0.9958	0.9958	0.9958	0.9958	0.9987
47	0.9998	0.9998	0.9998	0.9998	0.9998	0.9998
48	0.9984	0.9984	0.9984	0.9984	0.9987	0.9988
49	0.9939	0.994	0.994	0.994	0.9955	0.9956
50	0.9933	0.9934	0.9934	0.9934	0.9952	0.9953
51	0.9826	0.9901	0.9929	0.9939	0.9939	0.994
52	0.9826	0.9901	0.9928	0.9939	0.9939	0.994
53	0.9694	0.9867	0.9925	0.9948	0.9947	0.995
54	0.9674	0.9865	0.992	0.9941	0.9941	0.9943
55	0.9648	0.9862	0.9913	0.9933	0.9933	0.9935
56	0.9622	0.9861	0.9907	0.9925	0.9926	0.9927
57	0.9505	0.9875	0.9898	0.9908	0.9909	0.9909
58	0.9448	0.9883	0.9895	0.99	0.9902	0.9901
59	0.9426	0.9887	0.9894	0.9897	0.9899	0.9898
60	0.9402	0.9895	0.9897	0.9898	0.99	0.9899
61	0.9362	0.9898	0.9892	0.9891	0.9893	0.9892
62	0.9359	0.9896	0.989	0.9888	0.989	0.9889
63	0.9355	0.9892	0.9886	0.9884	0.9886	0.9885
64	0.9334	0.9872	0.9866	0.9865	0.9867	0.9865
65	0.9328	0.9866	0.986	0.9859	0.9861	0.9859
66	0.9583	0.9743	0.9895	0.9954	0.9953	0.996
67	0.9583	0.9743	0.9895	0.9954	0.9953	0.996
68	0.9543	0.9704	0.9889	0.9938	0.9936	0.9943
69	0.9543	0.9704	0.9889	0.9938	0.9936	0.9943

Keterangan = Mengalami *Undervoltage*

11. Tegangan Sistem Distribusi Radial IEEE 69 Bus skenario 5

Bus	Tanpa DG	Single DG	2 DG	3 DG	4 DG	5 DG
1	1	1	1	1	1	1
2	1	1	1	1	1	1
3	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999
4	0.9998	0.9999	0.9999	0.9999	0.9999	0.9999
5	0.9991	0.9993	0.9994	0.9995	0.9995	0.9995
6	0.9915	0.9951	0.9964	0.9969	0.9969	0.9969
7	0.9838	0.9908	0.9934	0.9943	0.9943	0.9944
8	0.9819	0.9898	0.9926	0.9938	0.9937	0.9938
9	0.9698	0.9865	0.9928	0.9953	0.9952	0.9953
10	0.9578	0.9747	0.9897	0.9955	0.9955	0.9955
11	0.9565	0.9734	0.9893	0.9954	0.9954	0.9954
12	0.9526	0.9696	0.9889	0.9941	0.994	0.994
13	0.949	0.9661	0.9903	0.9939	0.9939	0.9939
14	0.9455	0.9626	0.9918	0.9939	0.9939	0.9939
15	0.9419	0.9591	0.9934	0.9939	0.9939	0.9939
16	0.9413	0.9585	0.9936	0.9939	0.9939	0.9939
17	0.9402	0.9574	0.9944	0.9941	0.9941	0.9941
18	0.9402	0.9574	0.9943	0.9941	0.9941	0.9941
19	0.9397	0.9569	0.9939	0.9936	0.9936	0.9936
20	0.9393	0.9566	0.9936	0.9933	0.9933	0.9933
21	0.9388	0.9561	0.9931	0.9928	0.9928	0.9928
22	0.9388	0.9561	0.9931	0.9928	0.9928	0.9928
23	0.9387	0.956	0.993	0.9928	0.9927	0.9928
24	0.9386	0.9559	0.9929	0.9926	0.9926	0.9926
25	0.9385	0.9558	0.9928	0.9925	0.9925	0.9925
26	0.9384	0.9557	0.9927	0.9925	0.9925	0.9925
27	0.9384	0.9557	0.9927	0.9925	0.9925	0.9925
28	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999
29	0.9998	0.9998	0.9998	0.9998	0.9999	0.9999
30	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997
31	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997
32	0.9995	0.9995	0.9996	0.9996	0.9996	0.9996
33	0.9992	0.9992	0.9992	0.9992	0.9993	0.9993
34	0.9988	0.9988	0.9989	0.9989	0.9989	0.9989
35	0.9988	0.9988	0.9988	0.9988	0.9988	0.9988
36	0.9974	0.9974	0.9974	0.9974	0.9974	0.9974
37	0.9972	0.9972	0.9972	0.9972	0.9972	0.9972
38	0.997	0.997	0.997	0.997	0.997	0.997

39	0.997	0.997	0.997	0.997	0.997	0.997
40	0.997	0.997	0.997	0.997	0.997	0.997
41	0.9961	0.9961	0.9961	0.9961	0.9961	0.9961
42	0.9958	0.9958	0.9958	0.9958	0.9958	0.9958
43	0.9957	0.9957	0.9957	0.9957	0.9957	0.9957
44	0.9957	0.9957	0.9957	0.9957	0.9957	0.9957
45	0.9956	0.9956	0.9956	0.9956	0.9956	0.9956
46	0.9956	0.9956	0.9956	0.9956	0.9956	0.9956
47	0.9998	0.9998	0.9998	0.9998	0.9998	0.9998
48	0.9983	0.9983	0.9983	0.9983	0.9988	0.9988
49	0.9937	0.9937	0.9937	0.9937	0.9958	0.9958
50	0.993	0.9931	0.9931	0.9931	0.9956	0.9956
51	0.9819	0.9897	0.9926	0.9937	0.9937	0.9937
52	0.9819	0.9897	0.9926	0.9937	0.9937	0.9937
53	0.9681	0.9863	0.9923	0.9947	0.9946	0.9947
54	0.966	0.9861	0.9918	0.994	0.994	0.994
55	0.9633	0.9858	0.9911	0.9932	0.9931	0.9932
56	0.9606	0.9857	0.9905	0.9924	0.9923	0.9924
57	0.9484	0.9873	0.9897	0.9907	0.9905	0.9907
58	0.9424	0.9882	0.9894	0.99	0.9898	0.99
59	0.9401	0.9886	0.9894	0.9897	0.9895	0.9897
60	0.9377	0.9895	0.9897	0.9898	0.9896	0.9898
61	0.9336	0.9899	0.9893	0.9892	0.9888	0.9891
62	0.9332	0.9896	0.989	0.9888	0.9891	0.9891
63	0.9328	0.9892	0.9886	0.9884	0.9887	0.989
64	0.9306	0.9872	0.9865	0.9864	0.9867	0.9888
65	0.93	0.9866	0.9859	0.9858	0.9861	0.9882
66	0.9564	0.9734	0.9892	0.9954	0.9954	0.9954
67	0.9564	0.9734	0.9892	0.9954	0.9954	0.9954
68	0.9523	0.9693	0.9886	0.9937	0.9937	0.9937
69	0.9523	0.9693	0.9886	0.9937	0.9937	0.9937

Keterangan = Mengalami *Undervoltage*

12. Tegangan Sistem Distribusi Radial IEEE 69 Bus skenario 6

Bus	Tanpa DG	Single DG	2 DG	3 DG	4 DG	5 DG
1	1	1	1	1	1	1
2	1	1	1	1	1	1
3	0.9999	0.9999	0.9999	0.9999	1	1
4	0.9998	0.9999	0.9999	0.9999	0.9999	0.9999
5	0.9991	0.9994	0.9995	0.9995	0.9995	0.9995
6	0.992	0.9953	0.9966	0.997	0.9971	0.9971
7	0.9845	0.991	0.9936	0.9945	0.9946	0.9947
8	0.9828	0.99	0.9929	0.9939	0.994	0.9941
9	0.9712	0.9866	0.9929	0.9951	0.9953	0.9955
10	0.9593	0.9749	0.9898	0.995	0.9956	0.9956
11	0.958	0.9736	0.9894	0.9949	0.9956	0.9955
12	0.9542	0.9699	0.989	0.9937	0.9942	0.9942
13	0.9506	0.9664	0.9904	0.9936	0.9941	0.9942
14	0.947	0.9628	0.9918	0.9937	0.994	0.9942
15	0.9434	0.9594	0.9933	0.9939	0.994	0.9943
16	0.9428	0.9587	0.9936	0.9939	0.994	0.9944
17	0.9417	0.9576	0.9943	0.9941	0.9942	0.9946
18	0.9417	0.9576	0.9943	0.9941	0.9942	0.9946
19	0.9412	0.9571	0.9938	0.9936	0.9937	0.9941
20	0.9408	0.9568	0.9935	0.9933	0.9934	0.9938
21	0.9403	0.9563	0.993	0.9928	0.9929	0.9933
22	0.9403	0.9563	0.993	0.9928	0.9929	0.9933
23	0.9402	0.9562	0.993	0.9928	0.9928	0.9932
24	0.9401	0.9561	0.9928	0.9926	0.9927	0.9931
25	0.94	0.956	0.9927	0.9925	0.9926	0.993
26	0.94	0.9559	0.9927	0.9925	0.9926	0.9929
27	0.94	0.9559	0.9927	0.9925	0.9926	0.9929
28	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999
29	0.9998	0.9999	0.9999	0.9999	0.9999	0.9999
30	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997
31	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997
32	0.9996	0.9996	0.9996	0.9996	0.9996	0.9996
33	0.9993	0.9993	0.9993	0.9993	0.9993	0.9993
34	0.9989	0.9989	0.9989	0.9989	0.999	0.999
35	0.9989	0.9989	0.9989	0.9989	0.9989	0.9989
36	0.9976	0.9976	0.9976	0.9976	0.9976	0.9976
37	0.9974	0.9974	0.9974	0.9974	0.9975	0.9975
38	0.9973	0.9973	0.9973	0.9973	0.9973	0.9973

39	0.9972	0.9972	0.9972	0.9972	0.9972	0.9972
40	0.9972	0.9972	0.9972	0.9972	0.9972	0.9972
41	0.9964	0.9964	0.9965	0.9965	0.9965	0.9965
42	0.9961	0.9961	0.9961	0.9961	0.9961	0.9961
43	0.9961	0.9961	0.9961	0.9961	0.9961	0.9961
44	0.9961	0.9961	0.9961	0.9961	0.9961	0.9961
45	0.996	0.996	0.996	0.996	0.996	0.996
46	0.996	0.996	0.996	0.996	0.996	0.996
47	0.9998	0.9998	0.9998	0.9998	0.9998	0.9999
48	0.9984	0.9984	0.9985	0.9985	0.9988	0.999
49	0.9942	0.9942	0.9942	0.9942	0.9955	0.9964
50	0.9936	0.9936	0.9936	0.9937	0.9952	0.996
51	0.9828	0.99	0.9929	0.9939	0.994	0.9941
52	0.9827	0.99	0.9929	0.9939	0.994	0.9941
53	0.9696	0.9864	0.9924	0.9945	0.9948	0.995
54	0.9677	0.9862	0.9919	0.9939	0.9942	0.9944
55	0.9651	0.986	0.9913	0.9931	0.9934	0.9936
56	0.9627	0.9859	0.9907	0.9924	0.9926	0.9929
57	0.9514	0.9875	0.9899	0.9908	0.9909	0.9915
58	0.9459	0.9883	0.9895	0.99	0.9901	0.9908
59	0.9438	0.9887	0.9894	0.9898	0.9898	0.9906
60	0.9416	0.9895	0.9897	0.9898	0.9898	0.9907
61	0.9378	0.9899	0.9893	0.9892	0.9891	0.9901
62	0.9375	0.9896	0.989	0.9889	0.9889	0.9898
63	0.9371	0.9893	0.9886	0.9885	0.9885	0.9894
64	0.9351	0.9874	0.9867	0.9866	0.9866	0.9875
65	0.9345	0.9868	0.9862	0.9861	0.986	0.987
66	0.9579	0.9736	0.9893	0.9955	0.9955	0.9954
67	0.9579	0.9736	0.9893	0.9955	0.9955	0.9954
68	0.9538	0.9695	0.9887	0.9933	0.9938	0.9939
69	0.9538	0.9695	0.9887	0.9933	0.9938	0.9939

Keterangan = Mengalami *Undervoltage*