

Project:  
Location:  
Contract:  
Engineer:  
Filename: unbalance

ETAP  
12.6.0H  
  
Study Case: ULF

Page: 1  
Date: 05-05-2017  
SN:  
Revision: Base  
Config.: Normal

**Unbalanced Load Flow Report**

Bus		Phase	Voltage		Generation		Load		Load Flow						XFMR
ID	kV		% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	Phase	MW	Mvar	Amp	% PF	% Tap
* Bus1	33.000	A	100.005	0.0	0.939	0.390	0	0	Bus2	A	0.939	0.390	53.4	92.4	
		B	99.989	-120.0	0.928	0.413	0	0		B	0.928	0.413	53.3	91.4	
		C	100.007	120.0	0.914	0.392	0	0		C	0.914	0.392	52.2	91.9	
										N			0.0		
Bus2	33.000	A	99.999	0.0	0	0	0	0	Bus3	A	0.295	0.123	16.8	92.3	
		B	99.983	-120.0	0	0	0	0		B	0.288	0.136	16.7	90.4	
		C	100.000	120.0	0	0	0	0		C	0.280	0.123	16.1	91.5	
										N			0.0		
									Bus21	A	0.644	0.267	36.6	92.4	
										B	0.641	0.277	36.6	91.8	
										C	0.634	0.269	36.1	92.1	
										N			0.0		
									Bus1	A	-0.939	-0.390	53.4	92.4	
										B	-0.928	-0.413	53.3	91.4	
										C	-0.914	-0.392	52.2	91.9	
										N			0.0		
Bus3	33.000	A	99.996	0.0	0	0	0	0	Bus2	A	-0.295	-0.123	16.8	92.3	
		B	99.980	-120.0	0	0	0	0		B	-0.288	-0.136	16.7	90.4	
		C	99.999	120.0	0	0	0	0		C	-0.280	-0.123	16.1	91.5	
										N			0.0		
									Bus4	A	0.295	0.123	16.8	92.3	
										B	0.288	0.136	16.7	90.4	
										C	0.280	0.123	16.1	91.5	
										N			0.0		
Bus4	33.000	A	99.991	0.0	0	0	0	0	Bus3	A	-0.295	-0.123	16.8	92.3	
		B	99.975	-120.0	0	0	0	0		B	-0.288	-0.136	16.7	90.4	
		C	99.993	120.0	0	0	0	0		C	-0.280	-0.123	16.1	91.5	
										N			0.0		
									Bus6	A	0.288	0.118	16.3	92.5	
										B	0.280	0.131	16.2	90.5	
										C	0.273	0.118	15.6	91.8	
										N			0.0		
									Bus5	A	0.007	0.005	0.4	82.7	
										B	0.008	0.005	0.5	86.4	
										C	0.008	0.006	0.5	80.0	
										N			0.0		

Project:  
Location:  
Contract:  
Engineer:  
Filename: unbalance

**ETAP**  
**12.6.0H**  
  
Study Case: ULF

Page: 2  
Date: 05-05-2017  
SN:  
Revision: Base  
Config.: Normal

Bus		Voltage			Generation		Load		Load Flow						XFMR
ID	kV	Phase	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	Phase	MW	Mvar	Amp	% PF	% Tap
Bus5	0.400	A	99.613	29.8	0	0	0.008	0.004	Bus4	A	-0.008	-0.004	37.8	87.7	
		B	99.578	-90.2	0	0	0.008	0.005		B	-0.008	-0.005	40.8	86.5	
		C	99.607	149.9	0	0	0.007	0.005		C	-0.007	-0.005	36.5	80.0	
										N			3.1		
Bus6	33.000	A	99.981	0.0	0	0	0	0	Bus4	A	-0.288	-0.118	16.3	92.5	
		B	99.965	-120.0	0	0	0	0		B	-0.280	-0.131	16.2	90.5	
		C	99.983	120.0	0	0	0	0		C	-0.273	-0.117	15.6	91.8	
										N			0.0		
									Bus7	A	0.288	0.118	16.3	92.5	
										B	0.280	0.131	16.2	90.5	
										C	0.273	0.117	15.6	91.8	
										N			0.0		
Bus7	33.000	A	99.957	0.0	0	0	0	0	Bus9	A	0.269	0.106	15.2	93.0	
		B	99.941	-120.0	0	0	0	0		B	0.262	0.122	15.2	90.7	
		C	99.961	120.0	0	0	0	0		C	0.252	0.108	14.4	91.9	
										N			0.0		
									Bus6	A	-0.288	-0.118	16.3	92.5	
										B	-0.279	-0.131	16.2	90.5	
										C	-0.273	-0.117	15.6	91.8	
										N			0.0		
Bus8	0.400	A	99.702	29.8	0	0	0.017	0.008	Bus7	A	-0.017	-0.008	84.2	90.0	
		B	99.716	-90.2	0	0	0.017	0.008		B	-0.017	-0.008	82.8	91.0	
		C	99.660	149.8	0	0	0.021	0.011		C	-0.021	-0.011	102.8	89.0	
										N			18.2		
									Bus8	A	0.019	0.012	1.2	84.8	
										B	0.018	0.009	1.0	88.3	
										C	0.020	0.009	1.2	90.8	
										N			0.0		
Bus9	33.000	A	99.956	0.0	0	0	0	0	Bus7	A	-0.269	-0.106	15.2	93.0	
		B	99.940	-120.0	0	0	0	0		B	-0.262	-0.122	15.2	90.7	
		C	99.959	120.0	0	0	0	0		C	-0.252	-0.108	14.4	91.9	
										N			0.0		
									Bus10	A	0.057	0.025	3.3	91.8	
										B	0.056	0.028	3.3	89.6	
										C	0.054	0.025	3.1	90.6	
										N			0.0		

Project:  
Location:  
Contract:  
Engineer:  
Filename: unbalance

**ETAP**  
**12.6.0H**  
  
Study Case: ULF

Page: 3  
Date: 05-05-2017  
SN:  
Revision: Base  
Config.: Normal

Bus		Voltage			Generation		Load		Load Flow						XFMR
ID	kV	Phase	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	Phase	MW	Mvar	Amp	% PF	% Tap
Bus10	33.000								Bus145		A	0.211	0.082	11.9	93.3
											B	0.206	0.094	11.9	91.0
											C	0.198	0.083	11.3	92.3
											N		0.0		
		A	99.952	0.0	0	0	0	0	Bus11	A	0.006	0.002	0.3	93.7	
										B	0.005	0.003	0.3	89.5	
										C	0.005	0.002	0.3	95.6	
										N			0.0		
									Bus9		A	-0.057	-0.025	3.3	91.8
											B	-0.056	-0.028	3.3	89.6
											C	-0.054	-0.025	3.1	90.6
											N		0.0		
Bus11	33.000								Bus13		A	0.052	0.023	3.0	91.5
											B	0.051	0.025	3.0	89.6
											C	0.049	0.024	2.9	90.0
											N		0.0		
		A	99.952	0.0	0	0	0	0	Bus10	A	-0.006	-0.002	0.3	93.7	
										B	-0.005	-0.003	0.3	89.5	
										C	-0.005	-0.002	0.3	95.6	
										N			0.0		
									Bus12		A	0.006	0.002	0.3	93.7
											B	0.005	0.003	0.3	89.5
											C	0.005	0.002	0.3	95.6
											N		0.0		
Bus12	0.400	A	99.515	29.8	0	0	0.006	0.002	Bus11	A	-0.006	-0.002	26.9	92.8	
		B	99.620	-90.1	0	0	0.005	0.002		B	-0.005	-0.002	21.3	94.9	
		C	99.590	149.8	0	0	0.006	0.002		C	-0.006	-0.002	25.2	95.9	
										N			3.2		
Bus13	33.000	A	99.949	0.0	0	0	0	0	Bus15	A	0.040	0.020	2.4	89.6	
		B	99.933	-120.0	0	0	0	0		B	0.040	0.020	2.3	89.7	
		C	99.953	120.0	0	0	0	0		C	0.040	0.020	2.4	90.0	
										N			0.0		
									Bus10		A	-0.052	-0.023	3.0	91.5
											B	-0.051	-0.025	3.0	89.6
											C	-0.049	-0.024	2.9	90.0
											N		0.0		

Project:  
Location:  
Contract:  
Engineer:  
Filename: unbalance

**ETAP**  
**12.6.0H**  
  
Study Case: ULF

Page: 4  
Date: 05-05-2017  
SN:  
Revision: Base  
Config.: Normal

Bus			Voltage		Generation		Load		Load Flow							XFMR
ID	kV	Phase	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	Phase	MW	Mvar	Amp	% PF	% Tap	
Bus14	0.400	A	99.506	29.7	0	0	0.012	0.004	Bus14	A	0.011	0.003	0.6	97.2		
										B	0.011	0.006	0.7	89.1		
										C	0.009	0.004	0.5	90.4		
										N			0.0			
		B	99.491	-90.2	0	0	0.009	0.005	Bus13	A	-0.012	-0.004	54.4	95.4		
										B	-0.009	-0.005	46.3	87.5		
										C	-0.009	-0.002	42.1	97.4		
										N			0.0			
		C	99.652	149.8	0	0	0.009	0.002	Bus17	A	0.008	0.006	0.5	81.6		
										B	0.007	0.004	0.4	85.6		
										C	0.009	0.004	0.5	91.4		
										N			0.0			
Bus15	33.000	A	99.947	0.0	0	0	0	0	Bus13	A	-0.040	-0.020	2.4	89.6		
										B	-0.040	-0.020	2.3	89.7		
										C	-0.040	-0.020	2.4	90.0		
										N			0.0			
		B	99.931	-120.0	0	0	0	0	Bus20	A	0.032	0.014	1.9	91.4		
										B	0.033	0.016	1.9	90.5		
										C	0.032	0.016	1.9	89.6		
										N			0.0			
		C	99.951	120.0	0	0	0	0	Bus15	A	-0.008	-0.006	0.5	81.6		
										B	-0.007	-0.004	0.4	85.6		
										C	-0.009	-0.004	0.5	91.4		
										N			0.0			
Bus17	33.000	A	99.947	0.0	0	0	0	0	Bus18	A	0.008	0.006	0.5	81.6		
										B	0.007	0.004	0.4	85.6		
										C	0.009	0.004	0.5	91.4		
										N			0.0			
		B	99.931	-120.0	0	0	0	0	Bus17	A	-0.008	-0.006	0.5	81.6		
										B	-0.007	-0.004	0.4	85.6		
										C	-0.009	-0.004	0.5	91.4		
										N			0.0			
		C	99.951	120.0	0	0	0	0	Bus19	A	0.008	0.006	0.5	81.6		
										B	0.007	0.004	0.4	85.6		
										C	0.009	0.004	0.5	91.4		
										N			0.0			

Project:  
Location:  
Contract:  
Engineer:  
Filename: unbalance

**ETAP**  
**12.6.0H**  
  
Study Case: ULF

Page: 5  
Date: 05-05-2017  
SN:  
Revision: Base  
Config.: Normal

Bus		Voltage			Generation		Load		Load Flow						XFMR
ID	kV	Phase	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	Phase	MW	Mvar	Amp	% PF	% Tap
Bus19	0.400	A	99.591	29.8	0	0	0.007	0.004	Bus18	A	-0.007	-0.004	34.7	86.7	
		B	99.635	-90.2	0	0	0.007	0.003		B	-0.007	-0.003	32.5	90.3	
		C	99.516	149.8	0	0	0.009	0.005		C	-0.009	-0.005	45.6	88.0	
										N			10.0		
Bus20	0.400	A	99.192	29.4	0	0	0.034	0.014	Bus15	A	-0.034	-0.014	161.0	92.5	
		B	99.220	-90.5	0	0	0.032	0.014		B	-0.032	-0.014	151.8	91.8	
		C	99.220	149.5	0	0	0.030	0.015		C	-0.030	-0.015	147.5	90.0	
										N			17.0		
Bus21	33.000	A	99.991	0.0	0	0	0	0	Bus2	A	-0.644	-0.267	36.6	92.4	
		B	99.975	-120.0	0	0	0	0		B	-0.641	-0.277	36.6	91.8	
		C	99.994	120.0	0	0	0	0		C	-0.634	-0.269	36.1	92.1	
										N			0.0		
									Bus24	A	0.619	0.259	35.2	92.2	
										B	0.617	0.268	35.3	91.7	
										C	0.610	0.262	34.8	91.9	
										N			0.0		
									Bus22	A	0.025	0.008	1.4	95.4	
										B	0.024	0.009	1.3	93.4	
										C	0.024	0.007	1.3	95.5	
										N			0.0		
Bus22	0.400	A	99.095	29.4	0	0	0.024	0.008	Bus21	A	-0.024	-0.008	109.7	94.7	
		B	99.085	-90.6	0	0	0.023	0.008		B	-0.023	-0.008	108.4	94.0	
		C	99.203	149.4	0	0	0.025	0.006		C	-0.025	-0.006	112.3	97.5	
										N			12.3		
Bus24	33.000	A	99.958	0.0	0	0	0	0	Bus28	A	0.583	0.243	33.2	92.3	
		B	99.942	-120.0	0	0	0	0		B	0.586	0.250	33.4	92.0	
		C	99.961	120.0	0	0	0	0		C	0.578	0.249	33.0	91.9	
										N			0.0		
									Bus26	A	0.006	0.002	0.3	93.7	
										B	0.005	0.003	0.3	89.5	
										C	0.005	0.002	0.3	95.6	
										N			0.0		
									Bus21	A	-0.619	-0.259	35.2	92.3	
										B	-0.616	-0.268	35.3	91.7	
										C	-0.610	-0.262	34.8	91.9	
										N			0.0		

Project:  
Location:  
Contract:  
Engineer:  
Filename: unbalance

ETAP  
12.6.0H  
  
Study Case: ULF

Page: 6  
Date: 05-05-2017  
SN:  
Revision: Base  
Config.: Normal

Bus			Voltage		Generation		Load		Load Flow							XFMR
ID	kV	Phase	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	Phase	MW	Mvar	Amp	% PF	% Tap	
Bus25										A	0.030	0.014	1.7	90.6		
										B	0.026	0.016	1.6	85.5		
										C	0.026	0.011	1.5	91.9		
										N			0.0			
Bus25	0.400	A	99.507	29.7	0	0	0.031	0.016	Bus24	A	-0.031	-0.016	149.8	89.0		
		B	99.658	-90.3	0	0	0.024	0.010		B	-0.024	-0.010	112.8	93.0		
		C	99.613	149.7	0	0	0.027	0.012		C	-0.027	-0.012	127.2	91.0		
										N			34.9			
Bus26	33.000	A	99.958	0.0	0	0	0	0	Bus24	A	-0.006	-0.002	0.3	93.7		
		B	99.942	-120.0	0	0	0	0		B	-0.005	-0.003	0.3	89.5		
		C	99.960	120.0	0	0	0	0		C	-0.005	-0.002	0.3	95.6		
										N			0.0			
Bus27										A	0.006	0.002	0.3	93.7		
										B	0.005	0.003	0.3	89.5		
										C	0.005	0.002	0.3	95.6		
										N			0.0			
Bus27	0.400	A	99.522	29.8	0	0	0.006	0.002	Bus26	A	-0.006	-0.002	26.9	92.8		
		B	99.625	-90.1	0	0	0.005	0.002		B	-0.005	-0.002	21.3	94.9		
		C	99.595	149.8	0	0	0.006	0.002		C	-0.006	-0.002	25.2	95.9		
										N			3.2			
Bus28	33.000	A	99.942	0.0	0	0	0	0	Bus31	A	0.564	0.238	32.1	92.1		
		B	99.926	-120.0	0	0	0	0		B	0.566	0.243	32.3	91.9		
		C	99.944	120.0	0	0	0	0		C	0.560	0.242	32.1	91.8		
										N			0.0			
Bus24										A	-0.583	-0.243	33.2	92.3		
										B	-0.585	-0.250	33.4	92.0		
										C	-0.578	-0.249	33.0	91.9		
										N			0.0			
Bus30										A	0.019	0.005	1.0	96.9		
										B	0.020	0.007	1.1	94.8		
										C	0.018	0.006	1.0	94.4		
										N			0.0			
Bus30	0.400	A	99.562	29.6	0	0	0.021	0.006	Bus28	A	-0.021	-0.006	95.5	96.5		
		B	99.631	-90.3	0	0	0.019	0.004		B	-0.019	-0.004	82.9	97.4		
		C	99.636	149.7	0	0	0.016	0.005		C	-0.016	-0.005	74.2	95.0		
										N			24.1			

Project:  
Location:  
Contract:  
Engineer:  
Filename: unbalance

**ETAP**  
**12.6.0H**  
  
Study Case: ULF

Page: 7  
Date: 05-05-2017  
SN:  
Revision: Base  
Config.: Normal

Bus		Voltage			Generation		Load		Load Flow						XFMR
ID	kV	Phase	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	Phase	MW	Mvar	Amp	% PF	% Tap
Bus31	33.000	A	99.934	0.0	0	0	0	0	Bus32	A	0.046	0.018	2.6	92.9	
		B	99.917	-120.0	0	0	0	0		B	0.046	0.017	2.6	93.7	
		C	99.936	120.0	0	0	0	0		C	0.047	0.018	2.7	93.5	
										N			0.0		
									Bus28	A	-0.564	-0.238	32.1	92.1	
										B	-0.566	-0.243	32.3	91.9	
										C	-0.560	-0.242	32.1	91.8	
										N			0.0		
									Bus38	A	0.517	0.219	29.5	92.1	
										B	0.519	0.226	29.7	91.7	
										C	0.513	0.224	29.4	91.6	
										N			0.0		
Bus32	33.000	A	99.933	0.0	0	0	0	0	Bus31	A	-0.046	-0.018	2.6	92.9	
		B	99.917	-120.0	0	0	0	0		B	-0.046	-0.017	2.6	93.7	
		C	99.936	120.0	0	0	0	0		C	-0.047	-0.018	2.7	93.5	
										N			0.0		
									Bus35	A	0.007	0.005	0.4	82.7	
										B	0.008	0.005	0.5	86.4	
										C	0.008	0.006	0.5	80.0	
										N			0.0		
									Bus34	A	0.039	0.014	2.2	94.4	
										B	0.038	0.013	2.1	95.0	
										C	0.040	0.012	2.2	95.5	
										N			0.0		
Bus34	0.400	A	99.236	29.3	0	0	0.038	0.011	Bus32	A	-0.038	-0.011	174.0	96.0	
		B	99.237	-90.6	0	0	0.038	0.011		B	-0.038	-0.011	171.8	95.8	
		C	99.190	149.3	0	0	0.040	0.013		C	-0.040	-0.013	184.9	95.5	
										N			13.8		
Bus35	33.000	A	99.933	0.0	0	0	0	0	Bus32	A	-0.007	-0.005	0.4	82.7	
		B	99.916	-120.0	0	0	0	0		B	-0.008	-0.005	0.5	86.4	
		C	99.935	120.0	0	0	0	0		C	-0.008	-0.006	0.5	80.0	
										N			0.0		
									Bus37	A	0.007	0.005	0.4	82.7	
										B	0.008	0.005	0.5	86.4	
										C	0.008	0.006	0.5	80.0	
										N			0.0		

Project:  
Location:  
Contract:  
Engineer:  
Filename: unbalance

**ETAP**  
**12.6.0H**  
  
Study Case: ULF

Page: 8  
Date: 05-05-2017  
SN:  
Revision: Base  
Config.: Normal

Bus		Voltage			Generation		Load		Load Flow						XFMR
ID	kV	Phase	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	Phase	MW	Mvar	Amp	% PF	% Tap
Bus37	0.400	A	99.555	29.8	0	0	0.008	0.004	Bus35	A	-0.008	-0.004	37.8	87.7	
		B	99.519	-90.2	0	0	0.008	0.005		B	-0.008	-0.005	40.8	86.5	
		C	99.549	149.9	0	0	0.007	0.005		C	-0.007	-0.005	36.5	80.0	
										N			3.1		
Bus38	33.000	A	99.924	0.0	0	0	0	0	Bus42	A	0.053	0.021	3.0	93.1	
		B	99.908	-120.0	0	0	0	0		B	0.050	0.023	2.9	91.0	
		C	99.927	120.0	0	0	0	0		C	0.050	0.019	2.8	93.2	
										N			0.0		
									Bus31	A	-0.517	-0.219	29.5	92.1	
										B	-0.519	-0.226	29.7	91.7	
										C	-0.513	-0.224	29.4	91.6	
										N			0.0		
									Bus53	A	0.465	0.199	26.5	92.0	
										B	0.469	0.203	26.9	91.8	
										C	0.463	0.205	26.6	91.4	
										N			0.0		
Bus41	0.400	A	99.472	29.6	0	0	0.031	0.016	Bus42	A	-0.031	-0.016	149.9	89.0	
		B	99.624	-90.3	0	0	0.024	0.010		B	-0.024	-0.010	112.8	93.0	
		C	99.579	149.7	0	0	0.027	0.012		C	-0.027	-0.012	127.2	91.0	
										N			34.9		
Bus42	33.000	A	99.924	0.0	0	0	0	0	Bus38	A	-0.053	-0.021	3.0	93.1	
		B	99.907	-120.0	0	0	0	0		B	-0.050	-0.023	2.9	91.0	
		C	99.926	120.0	0	0	0	0		C	-0.050	-0.019	2.8	93.2	
										N			0.0		
									Bus43	A	0.023	0.007	1.2	95.9	
										B	0.024	0.007	1.3	96.1	
										C	0.023	0.008	1.3	94.6	
										N			0.0		
									Bus41	A	0.030	0.014	1.7	90.6	
										B	0.026	0.016	1.6	85.5	
										C	0.026	0.011	1.5	92.0	
										N			0.0		
Bus43	33.000	A	99.922	0.0	0	0	0	0	Bus42	A	-0.023	-0.007	1.2	95.9	
		B	99.906	-120.0	0	0	0	0		B	-0.024	-0.007	1.3	96.1	
		C	99.925	120.0	0	0	0	0		C	-0.023	-0.008	1.3	94.6	
										N			0.0		



Project:  
Location:  
Contract:  
Engineer:  
Filename: unbalance

**ETAP**  
**12.6.0H**  
  
Study Case: ULF

Page: 9  
Date: 05-05-2017  
SN:  
Revision: Base  
Config.: Normal

Bus		Voltage			Generation		Load		Load Flow						XFMR
ID	kV	Phase	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	Phase	MW	Mvar	Amp	% PF	% Tap
Bus44	33.000	A	99.918	0.0	0	0	0	0	Bus44	A	0.023	0.007	1.2	95.9	
										B	0.024	0.007	1.3	96.1	
										C	0.023	0.008	1.3	94.6	
										N			0.0		
Bus44	33.000	A	99.918	0.0	0	0	0	0	Bus47	A	0.004	0.002	0.2	89.5	
										B	0.005	0.002	0.3	95.9	
										C	0.005	0.003	0.3	85.3	
										N			0.0		
Bus46	0.400	A	98.672	29.4	0	0	0.018	0.006	Bus44	A	-0.018	-0.006	84.2	95.4	
										B	-0.019	-0.004	85.5	97.6	
										C	-0.017	-0.003	76.7	98.1	
										N			15.7		
Bus47	33.000	A	99.918	0.0	0	0	0	0	Bus44	A	-0.004	-0.002	0.2	89.5	
										B	-0.005	-0.002	0.3	95.9	
										C	-0.005	-0.003	0.3	85.3	
										N			0.0		
Bus51	33.000	A	99.917	0.0	0	0	0	0	Bus47	A	-0.004	-0.002	0.2	89.5	
										B	-0.005	-0.002	0.3	95.9	
										C	-0.005	-0.003	0.3	85.3	
										N			0.0		
Bus51	33.000	A	99.917	0.0	0	0	0	0	Bus52	A	0.004	0.002	0.2	89.5	
										B	0.005	0.002	0.3	95.9	
										C	0.005	0.003	0.3	85.3	
										N			0.0		

Project:  
Location:  
Contract:  
Engineer:  
Filename: unbalance

**ETAP**  
**12.6.0H**  
  
Study Case: ULF

Page: 10  
Date: 05-05-2017  
SN:  
Revision: Base  
Config.: Normal

Bus		Voltage			Generation		Load		Load Flow						XFMR
ID	kV	Phase	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	Phase	MW	Mvar	Amp	% PF	% Tap
Bus52	0.400	A	99.628	29.9	0	0	0.004	0.001	Bus51	A	-0.004	-0.001	18.7	95.8	
		B	99.463	-90.2	0	0	0.006	0.002		B	-0.006	-0.002	27.8	92.3	
		C	99.580	149.9	0	0	0.004	0.002		C	-0.004	-0.002	20.4	89.0	
										N			5.6		
Bus53	33.000	A	99.914	0.0	0	0	0	0	Bus54	A	0.465	0.199	26.5	92.0	
		B	99.898	-120.0	0	0	0	0		B	0.469	0.203	26.9	91.8	
		C	99.917	120.0	0	0	0	0		C	0.463	0.205	26.6	91.4	
										N			0.0		
									Bus38	A	-0.465	-0.199	26.5	92.0	
										B	-0.469	-0.203	26.9	91.8	
										C	-0.463	-0.205	26.6	91.4	
										N			0.0		
Bus54	33.000	A	99.906	0.0	0	0	0	0	Bus57	A	0.459	0.196	26.2	91.9	
		B	99.889	-120.0	0	0	0	0		B	0.464	0.200	26.6	91.8	
		C	99.908	120.0	0	0	0	0		C	0.458	0.203	26.3	91.4	
										N			0.0		
									Bus53	A	-0.465	-0.199	26.5	92.0	
										B	-0.469	-0.203	26.9	91.8	
										C	-0.463	-0.205	26.6	91.4	
										N			0.0		
									Bus56	A	0.006	0.002	0.3	93.7	
										B	0.005	0.003	0.3	89.5	
										C	0.005	0.002	0.3	95.6	
										N			0.0		
Bus56	0.400	A	99.469	29.8	0	0	0.006	0.002	Bus54	A	-0.006	-0.002	26.9	92.8	
		B	99.572	-90.2	0	0	0.005	0.002		B	-0.005	-0.002	21.3	94.9	
		C	99.543	149.8	0	0	0.006	0.002		C	-0.006	-0.002	25.2	95.9	
										N			3.2		
Bus57	33.000	A	99.901	0.0	0	0	0	0	Bus54	A	-0.459	-0.196	26.2	91.9	
		B	99.884	-120.0	0	0	0	0		B	-0.464	-0.200	26.6	91.8	
		C	99.903	120.0	0	0	0	0		C	-0.458	-0.203	26.3	91.4	
										N			0.0		
									Bus63	A	0.406	0.171	23.2	92.2	
										B	0.413	0.174	23.5	92.2	
										C	0.407	0.178	23.3	91.6	
										N			0.0		

Project:  
Location:  
Contract:  
Engineer:  
Filename: unbalance

**ETAP**  
**12.6.0H**  
  
Study Case: ULF

Page: 11  
Date: 05-05-2017  
SN:  
Revision: Base  
Config.: Normal

Bus		Voltage			Generation		Load		Load Flow						XFMR							
ID	kV	Phase	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	Phase	MW	Mvar	Amp	% PF	% Tap							
Bus59	0.400	A	99.449	29.6	0	0	0.031	0.016	Bus60	A	0.022	0.012	1.3	88.5								
										B	0.026	0.011	1.5	91.8								
										C	0.025	0.014	1.5	86.7								
										N			0.0									
		B	99.600	-90.3	0	0	0.024	0.010	Bus59	A	0.030	0.014	1.7	90.6								
										B	0.026	0.016	1.6	85.5								
										C	0.026	0.011	1.5	92.0								
										N			0.0									
	C	99.556	149.7	0	0	0.027	0.012	Bus57	A	-0.031	-0.016	149.9	89.0									
									B	-0.024	-0.010	112.9	93.0									
									C	-0.027	-0.012	127.2	91.0									
									N			34.9										
	33.000	A	99.899	0.0	0	0	0	0	Bus57	A	-0.022	-0.012	1.3	88.5								
										B	99.882	-120.0	0	0	0	0	B	-0.026	-0.011	1.5	91.8	
										C	99.902	120.0	0	0	0	0	C	-0.025	-0.014	1.5	86.7	
										N			0.0									
B		99.882	-120.0	0	0	0	0	Bus62	A	0.022	0.012	1.3	88.5									
									B	0.026	0.011	1.5	91.8									
									C	0.025	0.014	1.5	86.7									
									N			0.0										
C	99.902	120.0	0	0	0	0	Bus60	A	-0.022	-0.011	109.0	90.0										
								B	-0.027	-0.012	130.9	91.0										
								C	-0.022	-0.011	109.0	89.0										
								N			20.2											
33.000	A	99.895	0.0	0	0	0	0	Bus57	A	-0.406	-0.171	23.2	92.2									
									B	99.878	-120.0	0	0	0	0	B	-0.413	-0.174	23.5	92.2		
									C	99.897	120.0	0	0	0	0	C	-0.407	-0.178	23.3	91.6		
									N			0.0										
	B	99.878	-120.0	0	0	0	0	Bus64	A	0.406	0.171	23.2	92.2									
									B	0.413	0.174	23.5	92.2									
									C	0.407	0.178	23.3	91.6									
									N			0.0										
C	99.897	120.0	0	0	0	0	Bus69	A	0.023	0.007	1.3	95.5										
								B	0.024	0.007	1.3	95.5										
								C	0.023	0.008	1.3	94.0										
								N			0.0											

Project:  
Location:  
Contract:  
Engineer:  
Filename: unbalance

**ETAP**  
**12.6.0H**  
  
Study Case: ULF

Page: 12  
Date: 05-05-2017  
SN:  
Revision: Base  
Config.: Normal

Bus		Phase	Voltage		Generation		Load		Load Flow						XFMR									
ID	kV		% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	Phase	MW	Mvar	Amp	% PF	% Tap									
									Bus63	A	-0.406	-0.171	23.2	92.2										
										B	-0.413	-0.174	23.5	92.2										
										C	-0.407	-0.178	23.3	91.6										
										N			0.0											
									Bus70	A	0.344	0.145	19.6	92.1										
										B	0.352	0.148	20.0	92.2										
										C	0.346	0.153	19.9	91.5										
										N			0.0											
									Bus66	A	0.039	0.018	2.3	90.9										
										B	0.037	0.019	2.2	89.6										
										C	0.038	0.016	2.2	91.7										
										N			0.0											
Bus66	0.400	A	98.954	29.3	0	0	0.040	0.018	Bus64	A	-0.040	-0.018	193.0	91.5										
		B	99.112	-90.6	0	0	0.036	0.014		B	-0.036	-0.014	168.0	93.0										
		C	99.005	149.4	0	0	0.038	0.018		C	-0.038	-0.018	181.2	90.6										
								N				29.4												
Bus68	0.400	A	99.401	29.6	0	0	0.023	0.009	Bus69	A	-0.023	-0.009	106.0	93.6										
		B	99.442	-90.5	0	0	0.026	0.007		B	-0.026	-0.007	116.4	97.0										
		C	99.545	149.6	0	0	0.020	0.005		C	-0.020	-0.005	91.6	96.8										
								N				33.2												
Bus69	33.000	A	99.885	0.0	0	0	0	0	Bus64	A	-0.023	-0.007	1.3	95.5										
		B	99.868	-120.0	0	0	0	0		B	-0.024	-0.007	1.3	95.5										
		C	99.887	120.0	0	0	0	0		C	-0.023	-0.008	1.3	94.0										
								N				0.0												
									Bus68	A	0.023	0.007	1.3	95.5										
										B	0.024	0.007	1.3	95.5										
										C	0.023	0.008	1.3	94.0										
										N			0.0											
									Bus70	33.000	A	99.871	0.0	0	0	0	0	Bus83	A	0.263	0.116	15.1	91.4	
											B	99.854	-120.0	0	0	0	0		B	0.275	0.116	15.7	92.2	
											C	99.873	120.0	0	0	0	0		C	0.270	0.127	15.7	90.5	
																	N				0.0			
									Bus64	A	-0.344	-0.145	19.6	92.1										
										B	-0.352	-0.148	20.0	92.2										
										C	-0.346	-0.153	19.9	91.5										
										N			0.0											

Project:  
Location:  
Contract:  
Engineer:  
Filename: unbalance

**ETAP**  
**12.6.0H**  
  
Study Case: ULF

Page: 13  
Date: 05-05-2017  
SN:  
Revision: Base  
Config.: Normal

Bus			Voltage		Generation		Load		Load Flow							XFMR	
ID	kV	Phase	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	Phase	MW	Mvar	Amp	% PF	% Tap		
									Bus73	A	0.042	0.015	2.4	94.0			
										B	0.038	0.020	2.2	88.9			
										C	0.036	0.014	2.0	93.6			
										N			0.0				
										Bus72	A	0.039	0.014	2.2	94.4		
											B	0.038	0.013	2.1	95.0		
											C	0.040	0.012	2.2	95.5		
											N			0.0			
		Bus72	0.400	A	99.173	29.3	0	0	0.038	0.011	Bus70	A	-0.038	-0.011	174.1	96.0	
				B	99.174	-90.7	0	0	0.038	0.011		B	-0.038	-0.011	171.9	95.8	
				C	99.128	149.3	0	0	0.040	0.013		C	-0.040	-0.013	185.0	95.5	
										N				13.8			
	Bus73	33.000	A	99.868	0.0	0	0	0	0	Bus76	A	0.025	0.011	1.4	92.0		
			B	99.850	-120.0	0	0	0	0		B	0.021	0.010	1.2	89.6		
			C	99.870	120.0	0	0	0	0		C	0.023	0.007	1.3	96.0		
									N				0.0				
									Bus70	A	-0.042	-0.015	2.4	94.0			
										B	-0.038	-0.020	2.2	88.9			
										C	-0.036	-0.014	2.0	93.6			
										N			0.0				
										Bus75	A	0.017	0.005	0.9	96.5		
											B	0.017	0.009	1.0	88.0		
											C	0.013	0.007	0.8	88.5		
											N			0.0			
	Bus75	0.400	A	99.408	29.6	0	0	0.020	0.008	Bus73	A	-0.020	-0.008	96.0	92.4		
			B	99.545	-90.3	0	0	0.015	0.006		B	-0.015	-0.006	70.3	94.0		
			C	99.624	149.8	0	0	0.011	0.005		C	-0.011	-0.005	52.9	92.5		
									N				40.6				
Bus76	33.000	A	99.866	0.0	0	0	0	0	Bus79	A	0.019	0.006	1.0	95.2			
		B	99.849	-120.0	0	0	0	0		B	0.016	0.005	0.9	94.8			
		C	99.869	120.0	0	0	0	0		C	0.018	0.003	1.0	98.7			
								N				0.0					
									Bus73	A	-0.025	-0.011	1.4	92.0			
										B	-0.021	-0.010	1.2	89.6			
										C	-0.023	-0.007	1.3	96.0			
										N			0.0				

Project:

ETAP

Page: 14

Location:

12.6.0H

Date: 05-05-2017

Contract:

SN:

Engineer:

Study Case: ULF

Revision: Base

Filename: unbalance

Config.: Normal

Bus		Voltage			Generation		Load		Load Flow						XFMR
ID	kV	Phase	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	Phase	MW	Mvar	Amp	% PF	% Tap
Bus78									A	0.006	0.005	0.4	80.3		
									B	0.005	0.005	0.4	70.6		
									C	0.005	0.004	0.3	79.9		
									N			0.0			
Bus78	0.400	A	99.486	29.9	0	0	0.006	0.005	Bus76	A	-0.006	-0.005	34.3	80.0	
		B	99.593	-90.1	0	0	0.004	0.003		B	-0.004	-0.003	23.9	78.8	
		C	99.558	149.9	0	0	0.005	0.004		C	-0.005	-0.004	29.1	79.3	
										N			9.2		
Bus79	33.000	A	99.866	0.0	0	0	0	0	Bus76	A	-0.019	-0.006	1.0	95.2	
		B	99.849	-120.0	0	0	0	0		B	-0.016	-0.005	0.9	94.8	
		C	99.868	120.0	0	0	0	0		C	-0.018	-0.003	1.0	98.7	
										N			0.0		
Bus82									A	0.019	0.006	1.0	95.2		
									B	0.016	0.005	0.9	94.8		
									C	0.018	0.003	1.0	98.7		
									N			0.0			
Bus81	0.400	A	99.252	29.5	0	0	0.018	0.005	Bus82	A	-0.018	-0.005	82.2	97.0	
		B	99.440	-90.4	0	0	0.014	0.002		B	-0.014	-0.002	62.6	98.5	
		C	99.190	149.5	0	0	0.020	0.006		C	-0.020	-0.006	90.1	96.3	
										N			25.9		
Bus82	33.000	A	99.865	0.0	0	0	0	0	Bus79	A	-0.019	-0.006	1.0	95.2	
		B	99.848	-120.0	0	0	0	0		B	-0.016	-0.005	0.9	94.8	
		C	99.868	120.0	0	0	0	0		C	-0.018	-0.003	1.0	98.7	
										N			0.0		
Bus81									A	0.019	0.006	1.0	95.2		
									B	0.016	0.005	0.9	94.8		
									C	0.018	0.003	1.0	98.7		
									N			0.0			
Bus83	33.000	A	99.866	0.0	0	0	0	0	Bus70	A	-0.263	-0.116	15.1	91.4	
		B	99.848	-120.0	0	0	0	0		B	-0.275	-0.116	15.7	92.2	
		C	99.868	120.0	0	0	0	0		C	-0.270	-0.127	15.7	90.5	
										N			0.0		
Bus87									A	0.244	0.112	14.1	90.9		
									B	0.257	0.110	14.7	91.9		
									C	0.252	0.122	14.7	90.0		
									N			0.0			

Project:  
Location:  
Contract:  
Engineer:  
Filename: unbalance

**ETAP**  
**12.6.0H**  
  
Study Case: ULF

Page: 15  
Date: 05-05-2017  
SN:  
Revision: Base  
Config.: Normal

Bus			Voltage		Generation		Load		Load Flow						XFMR
ID	kV	Phase	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	Phase	MW	Mvar	Amp	% PF	% Tap
									Bus86	A	0.019	0.005	1.0	96.8	
									B	0.018	0.005	1.0	95.9		
									C	0.018	0.005	1.0	96.3		
									N			0.0			
Bus85	0.400	A	99.192	29.5	0	0	0.018	0.006	Bus86	A	-0.018	-0.006	84.0	95.4	
		B	99.244	-90.5	0	0	0.019	0.004	B	-0.019	-0.004	85.3	97.4		
		C	99.350	149.5	0	0	0.017	0.003	C	-0.017	-0.003	76.5	98.1		
								N			15.3				
Bus86	33.000	A	99.865	0.0	0	0	0	0	Bus83	A	-0.019	-0.005	1.0	96.8	
		B	99.848	-120.0	0	0	0	0	B	-0.018	-0.005	1.0	95.9		
		C	99.867	120.0	0	0	0	0	C	-0.018	-0.005	1.0	96.3		
								N			0.0				
									Bus85	A	0.019	0.005	1.0	96.8	
									B	0.018	0.005	1.0	95.9		
									C	0.018	0.005	1.0	96.3		
									N			0.0			
Bus87	33.000	A	99.856	0.0	0	0	0	0	Bus83	A	-0.244	-0.112	14.1	91.0	
		B	99.838	-120.0	0	0	0	0	B	-0.257	-0.110	14.7	91.9		
		C	99.857	120.0	0	0	0	0	C	-0.252	-0.122	14.7	90.0		
								N			0.0				
									Bus90	A	0.227	0.106	13.2	90.6	
									B	0.242	0.102	13.8	92.1		
									C	0.237	0.117	13.9	89.7		
									N			0.0			
									Bus89	A	0.017	0.005	0.9	95.5	
									B	0.015	0.008	0.9	89.4		
									C	0.014	0.005	0.8	94.8		
									N			0.0			
Bus89	0.400	A	99.132	29.5	0	0	0.019	0.007	Bus87	A	-0.019	-0.007	87.5	94.5	
		B	99.380	-90.3	0	0	0.013	0.004	B	-0.013	-0.004	58.2	95.3		
		C	99.289	149.6	0	0	0.015	0.006	C	-0.015	-0.006	67.8	93.4		
								N			28.9				
Bus90	33.000	A	99.840	0.0	0	0	0	0	Bus113	A	0.113	0.049	6.5	91.8	
		B	99.821	-120.0	0	0	0	0	B	0.118	0.039	6.6	94.9		
		C	99.840	120.0	0	0	0	0	C	0.124	0.049	7.0	93.1		
								N			0.0				

Project:  
Location:  
Contract:  
Engineer:  
Filename: unbalance

ETAP  
12.6.0H  
  
Study Case: ULF

Page: 16  
Date: 05-05-2017  
SN:  
Revision: Base  
Config.: Normal

Bus		Voltage			Generation		Load		Load Flow						XFMR
ID	kV	Phase	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	Phase	MW	Mvar	Amp	% PF	% Tap
Bus92	0.400	A	99.343	29.5	0	0	0.028	0.008	Bus93	A	0.087	0.047	5.2	87.9	
									B	0.092	0.053	5.6	86.7		
									C	0.085	0.054	5.3	84.3		
									N			0.0			
		B	99.153	-90.5	0	0	0.031	0.013	Bus87	A	-0.227	-0.106	13.2	90.6	
									B	-0.241	-0.102	13.8	92.1		
									C	-0.237	-0.117	13.9	89.7		
									N			0.0			
		C	99.245	149.5	0	0	0.026	0.012	Bus92	A	0.026	0.010	1.5	93.4	
									B	0.031	0.010	1.7	95.0		
									C	0.029	0.014	1.7	89.3		
									N			0.0			
	33.000	A	99.836	0.0	0	0	0	0	Bus90	A	-0.028	-0.008	126.5	96.5	
									B	-0.031	-0.013	146.2	92.6		
									C	-0.026	-0.012	125.7	91.5		
									N			7.5			
		B	99.817	-120.0	0	0	0	0	Bus96	A	0.080	0.043	4.8	88.4	
									B	0.084	0.048	5.1	86.8		
									C	0.077	0.048	4.8	84.8		
									N			0.0			
		C	99.836	120.0	0	0	0	0	Bus90	A	-0.087	-0.047	5.2	87.9	
									B	-0.092	-0.053	5.6	86.7		
									C	-0.085	-0.054	5.3	84.3		
									N			0.0			
0.400	A	99.457	29.8	0	0	0.008	0.004	Bus95	A	0.007	0.005	0.4	82.7		
								B	0.008	0.005	0.5	86.4			
								C	0.008	0.006	0.5	80.0			
								N			0.0				
	B	99.419	-90.2	0	0	0.008	0.005	Bus93	A	-0.008	-0.004	37.8	87.7		
								B	-0.008	-0.005	40.8	86.5			
								C	-0.007	-0.005	36.5	80.0			
								N			3.1				
	C	99.451	149.8	0	0	0.007	0.005	Bus93	A	-0.080	-0.043	4.8	88.4		
								B	-0.084	-0.048	5.1	86.8			
								C	-0.077	-0.048	4.8	84.8			
								N			0.0				
33.000	A	99.835	0.0	0	0	0	0	Bus93	A	-0.080	-0.043	4.8	88.4		
								B	-0.084	-0.048	5.1	86.8			
								C	-0.077	-0.048	4.8	84.8			
								N			0.0				
	B	99.816	-120.0	0	0	0	0	Bus93	A	-0.080	-0.043	4.8	88.4		
								B	-0.084	-0.048	5.1	86.8			
								C	-0.077	-0.048	4.8	84.8			
								N			0.0				
	C	99.835	120.0	0	0	0	0	Bus93	A	-0.080	-0.043	4.8	88.4		
								B	-0.084	-0.048	5.1	86.8			
								C	-0.077	-0.048	4.8	84.8			
								N			0.0				



Project:  
Location:  
Contract:  
Engineer:  
Filename: unbalance

**ETAP**  
**12.6.0H**  
  
Study Case: ULF

Page: 17  
Date: 05-05-2017  
SN:  
Revision: Base  
Config.: Normal

Bus		Voltage			Generation		Load		Load Flow						XFMR
ID	kV	Phase	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	Phase	MW	Mvar	Amp	% PF	% Tap
Bus98	0.400	A	99.454	29.6	0	0	0.021	0.006	Bus103	A	0.041	0.013	2.3	95.4	
										B	0.038	0.018	2.2	91.0	
										C	0.036	0.013	2.0	94.1	
										N			0.0		
									Bus99	A	0.020	0.025	1.7	63.1	
										B	0.026	0.024	1.8	73.3	
										C	0.024	0.029	2.0	62.9	
										N			0.0		
									Bus98	A	0.019	0.005	1.0	96.9	
										B	0.020	0.007	1.1	94.8	
										C	0.018	0.006	1.0	94.4	
										N			0.0		
Bus98	0.400	A	99.454	29.6	0	0	0.021	0.006	Bus96	A	-0.021	-0.006	95.6	96.5	
		B	99.520	-90.3	0	0	0.019	0.004		B	-0.019	-0.004	82.9	97.4	
		C	99.527	149.7	0	0	0.016	0.005		C	-0.016	-0.005	74.3	95.0	
										N			24.1		
Bus99	33.000	A	99.834	0.0	0	0	0	0	Bus102	A	0.020	0.025	1.7	63.1	
										B	0.026	0.024	1.8	73.3	
										C	0.024	0.029	2.0	62.9	
										N			0.0		
									Bus96	A	-0.020	-0.025	1.7	63.1	
										B	-0.026	-0.024	1.8	73.3	
										C	-0.024	-0.029	2.0	62.9	
										N			0.0		
									Bus101	A	-0.022	-0.022	134.8	71.6	
										B	-0.026	-0.026	161.5	70.8	
										C	-0.020	-0.026	145.8	60.9	
										N			4.0		
Bus102	33.000	A	99.833	0.0	0	0	0	0	Bus99	A	-0.020	-0.025	1.7	63.1	
										B	-0.026	-0.024	1.8	73.3	
										C	-0.024	-0.029	2.0	62.9	
										N			0.0		
									Bus101	A	0.020	0.025	1.7	63.1	
										B	0.026	0.024	1.8	73.3	
										C	0.024	0.029	2.0	62.9	
										N			0.0		
										A	0.020	0.025	1.7	63.1	
										B	0.026	0.024	1.8	73.3	
										C	0.024	0.029	2.0	62.9	
										N			0.0		



Project:  
Location:  
Contract:  
Engineer:  
Filename: unbalance

ETAP  
12.6.0H  
  
Study Case: ULF

Page: 19  
Date: 05-05-2017  
SN:  
Revision: Base  
Config.: Normal

Bus		Voltage			Generation		Load		Load Flow						XFMR
ID	kV	Phase	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	Phase	MW	Mvar	Amp	% PF	% Tap
Bus114	33.000	A	99.833	0.0	0	0	0	0	Bus113	A	-0.113	-0.049	6.5	91.8	
		B	99.815	-120.0	0	0	0	0		B	-0.118	-0.039	6.6	94.9	
		C	99.833	120.0	0	0	0	0		C	-0.124	-0.049	7.0	93.1	
										N			0.0		
									Bus120	A	0.006	0.003	0.4	91.6	
										B	0.009	0.002	0.5	98.7	
										C	0.009	0.005	0.5	88.9	
										N			0.0		
									Bus121	A	0.097	0.039	5.5	92.7	
										B	0.099	0.035	5.5	94.2	
										C	0.102	0.039	5.7	93.4	
										N			0.0		
									Bus116	A	0.009	0.007	0.6	81.5	
										B	0.010	0.002	0.5	97.0	
										C	0.013	0.005	0.7	93.5	
										N			0.0		
Bus116	0.400	A	99.554	29.8	0	0	0.006	0.003	Bus114	A	-0.006	-0.003	30.4	92.8	
		B	99.346	-90.3	0	0	0.012	0.005		B	-0.012	-0.005	55.6	93.3	
		C	99.280	149.7	0	0	0.014	0.006		C	-0.014	-0.006	64.8	92.7	
										N			30.0		
Bus119	0.400	A	99.561	29.8	0	0	0.007	0.002	Bus120	A	-0.007	-0.002	32.1	95.3	
		B	99.476	-90.3	0	0	0.011	0.002		B	-0.011	-0.002	49.5	98.0	
		C	99.556	149.8	0	0	0.006	0.003		C	-0.006	-0.003	29.5	89.0	
										N			17.7		
Bus120	33.000	A	99.833	0.0	0	0	0	0	Bus114	A	-0.006	-0.003	0.4	91.6	
		B	99.814	-120.0	0	0	0	0		B	-0.009	-0.002	0.5	98.7	
		C	99.832	120.0	0	0	0	0		C	-0.009	-0.005	0.5	88.9	
										N			0.0		
									Bus119	A	0.006	0.003	0.4	91.6	
										B	0.009	0.002	0.5	98.7	
										C	0.009	0.005	0.5	88.9	
										N			0.0		
									Bus124	A	0.027	0.009	1.5	95.4	
										B	0.030	0.010	1.7	95.1	
										C	0.028	0.012	1.6	91.6	
										N			0.0		

Project:  
Location:  
Contract:  
Engineer:  
Filename: unbalance

**ETAP**  
**12.6.0H**  
  
Study Case: ULF

Page: 20  
Date: 05-05-2017  
SN:  
Revision: Base  
Config.: Normal

Bus		Voltage			Generation		Load		Load Flow						XFMR
ID	kV	Phase	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	Phase	MW	Mvar	Amp	% PF	% Tap
Bus124	33.000	A	99.826	0.0	0	0	0	0	Bus126	A	0.070	0.031	4.0	91.6	
										B	0.069	0.025	3.9	93.8	
										C	0.074	0.027	4.1	94.0	
										N			0.0		
									Bus114	A	-0.097	-0.039	5.5	92.7	
										B	-0.099	-0.035	5.5	94.2	
										C	-0.102	-0.039	5.7	93.4	
										N			0.0		
		A	99.826	120.0	0	0	0	0	Bus121	A	-0.027	-0.009	1.5	95.4	
										B	-0.030	-0.010	1.7	95.1	
										C	-0.028	-0.012	1.6	91.6	
										N			0.0		
Bus125	0.400	A	99.230	29.5	0	0	0.029	0.007	Bus125	A	0.027	0.009	1.5	95.4	
										B	0.030	0.010	1.7	95.1	
										C	0.028	0.012	1.6	91.6	
										N			0.0		
		A	99.095	-90.4	0	0	0.029	0.011	Bus124	A	-0.029	-0.007	129.2	97.2	
										B	-0.029	-0.011	135.8	93.3	
										C	-0.027	-0.010	123.1	94.0	
										N			5.7		
		A	99.823	0.0	0	0	0	0	Bus127	A	0.045	0.023	2.6	89.2	
										B	0.045	0.016	2.5	93.9	
										C	0.050	0.020	2.8	93.3	
										N			0.0		
Bus126	33.000	A	99.820	0.0	0	0	0	0	Bus121	A	-0.070	-0.031	4.0	91.6	
										B	-0.069	-0.025	3.9	93.8	
										C	-0.074	-0.027	4.1	94.0	
										N			0.0		
									Bus142	A	0.025	0.008	1.4	95.4	
										B	0.024	0.009	1.3	93.4	
										C	0.024	0.007	1.3	95.5	
										N			0.0		
		A	99.802	-120.0	0	0	0	0	Bus126	A	-0.045	-0.023	2.6	89.2	
										B	-0.045	-0.016	2.5	93.9	
										C	-0.050	-0.020	2.8	93.3	
										N			0.0		

Project:  
Location:  
Contract:  
Engineer:  
Filename: unbalance

**ETAP**  
**12.6.0H**  
  
Study Case: ULF

Page: 21  
Date: 05-05-2017  
SN:  
Revision: Base  
Config.: Normal

Bus			Voltage		Generation		Load		Load Flow						XFMR	
ID	kV	Phase	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	Phase	MW	Mvar	Amp	% PF	% Tap	
									Bus132	A	0.033	0.019	2.0	86.7		
									B	0.034	0.014	1.9	92.2			
									C	0.038	0.017	2.2	91.2			
									N			0.0				
		Bus129	A	0.012	0.004	0.6	95.3									
		B	0.011	0.002	0.6	98.0										
		C	0.013	0.003	0.7	98.1										
		N			0.0											
	Bus129	0.400	A	99.457	29.7	0	0	0.010	0.003	Bus127	A	-0.010	-0.003	46.5	96.6	
	B	99.455	-90.3	0	0	0.012	0.002	B	-0.012	-0.002	53.9	98.7				
	C	99.444	149.6	0	0	0.013	0.002	C	-0.013	-0.002	56.5	98.3				
	N							N			7.9					
	Bus132	33.000	A	99.816	0.0	0	0	0	0	Bus135	A	0.021	0.012	1.3	85.7	
	B	99.799	-120.0	0	0	0	0	B	0.022	0.011	1.3	90.3				
	C	99.816	120.0	0	0	0	0	C	0.023	0.013	1.4	87.0				
	N							N			0.0					
									Bus127	A	-0.033	-0.019	2.0	86.7		
									B	-0.034	-0.014	1.9	92.2			
									C	-0.038	-0.017	2.2	91.2			
									N			0.0				
		Bus134	A	0.000	0.000	0.0	0.0									
		B	0.000	0.000	0.0	0.0										
		C	0.000	0.000	0.0	0.0										
		N			0.0											
	Bus133	A	0.013	0.007	0.7	88.2										
	B	0.011	0.003	0.6	95.7											
	C	0.015	0.004	0.8	96.6											
	N			0.0												
	Bus133	0.400	A	99.402	29.7	0	0	0.010	0.004	Bus132	A	-0.010	-0.004	45.6	92.1	
	B	99.357	-90.3	0	0	0.013	0.004	B	-0.013	-0.004	58.2	96.2				
	C	99.261	149.6	0	0	0.016	0.005	C	-0.016	-0.005	71.3	95.5				
	N							N			19.1					
Bus134	33.000	A	99.816	0.0	0	0	0	0	Bus132	A	0.000	0.000	0.0	0.0		
B	99.799	-120.0	0	0	0	0	B	0.000	0.000	0.0	0.0					
C	99.816	120.0	0	0	0	0	C	0.000	0.000	0.0	0.0					
N							N			0.0						

Project:  
Location:  
Contract:  
Engineer:  
Filename: unbalance

**ETAP**  
**12.6.0H**  
  
Study Case: ULF

Page: 22  
Date: 05-05-2017  
SN:  
Revision: Base  
Config.: Normal

Bus		Phase	Voltage		Generation		Load		ID	Load Flow					XFMR	
ID	kV		% Mag.	Ang.	MW	Mvar	MW	Mvar		Phase	MW	Mvar	Amp	% PF	% Tap	
Bus135	33.000	A	99.815	0.0	0	0	0	0	Bus132	A	-0.021	-0.012	1.3	85.7		
		B	99.797	-120.0	0	0	0	0		B	-0.022	-0.011	1.3	90.3		
		C	99.814	120.0	0	0	0	0		C	-0.023	-0.013	1.4	87.0		
										N			0.0			
									Bus138	A	0.021	0.012	1.3	85.7		
										B	0.022	0.011	1.3	90.3		
										C	0.023	0.013	1.4	87.0		
										N			0.0			
Bus138	33.000	A	99.813	0.0	0	0	0	0	Bus135	A	-0.021	-0.012	1.3	85.7		
		B	99.795	-120.0	0	0	0	0		B	-0.022	-0.011	1.3	90.3		
		C	99.812	120.0	0	0	0	0		C	-0.023	-0.013	1.4	87.0		
										N			0.0			
									Bus139	A	0.021	0.012	1.3	85.7		
										B	0.022	0.011	1.3	90.3		
										C	0.023	0.013	1.4	87.0		
										N			0.0			
Bus139	0.400	A	98.891	29.5	0	0	0.019	0.010	Bus138	A	-0.019	-0.010	95.9	88.0		
		B	98.701	-90.6	0	0	0.024	0.012		B	-0.024	-0.012	117.8	89.0		
		C	98.801	149.5	0	0	0.022	0.011		C	-0.022	-0.011	109.0	89.0		
										N			20.0			
Bus142	33.000	A	99.819	0.0	0	0	0	0	Bus126	A	-0.025	-0.008	1.4	95.4		
		B	99.801	-120.0	0	0	0	0		B	-0.024	-0.009	1.3	93.4		
		C	99.819	120.0	0	0	0	0		C	-0.024	-0.007	1.3	95.5		
										N			0.0			
									Bus143	A	0.025	0.008	1.4	95.4		
										B	0.024	0.009	1.3	93.4		
										C	0.024	0.007	1.3	95.5		
										N			0.0			
Bus143	0.400	A	98.921	29.4	0	0	0.024	0.008	Bus142	A	-0.024	-0.008	109.8	94.7		
		B	98.909	-90.6	0	0	0.023	0.008		B	-0.023	-0.008	108.5	94.0		
		C	99.029	149.3	0	0	0.025	0.006		C	-0.025	-0.006	112.4	97.5		
										N			12.3			
Bus145	33.000	A	99.944	0.0	0	0	0	0	Bus146	A	0.211	0.081	11.9	93.3		
		B	99.927	-120.0	0	0	0	0		B	0.206	0.094	11.9	91.0		
		C	99.948	120.0	0	0	0	0		C	0.198	0.083	11.3	92.3		
										N			0.0			

Project:

Location:

Contract:

Engineer:

Filename: unbalance

ETAP

12.6.0H

Page: 23

Date: 05-05-2017

SN:

Revision: Base

Config.: Normal

Study Case: ULF

Bus		Voltage			Generation		Load		Load Flow						XFMR
ID	kV	Phase	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	Phase	MW	Mvar	Amp	% PF	% Tap
Bus146	33.000	A	99.941	0.0	0	0	0	0	Bus9	A	-0.211	-0.081	11.9	93.3	
										B	-0.206	-0.094	11.9	91.0	
										C	-0.198	-0.083	11.3	92.3	
										N			0.0		
		B	99.925	-120.0	0	0	0	0	Bus152	A	0.032	0.014	1.9	91.3	
										B	0.029	0.016	1.7	88.2	
										C	0.030	0.012	1.7	92.2	
										N			0.0		
		C	99.946	120.0	0	0	0	0		A	-0.211	-0.081	11.9	93.3	
										B	-0.206	-0.094	11.9	91.0	
										C	-0.198	-0.083	11.3	92.3	
										N			0.0		
Bus148	0.400	A	99.102	29.5	0	0	0.019	0.009	Bus145	A	0.155	0.055	8.7	94.2	
										B	0.151	0.065	8.6	91.8	
										C	0.144	0.056	8.1	93.1	
										N			0.0		
		B	99.002	-90.4	0	0	0.020	0.011	Bus172	A	0.006	0.002	0.3	95.3	
										B	0.006	0.003	0.3	89.8	
										C	0.005	0.002	0.3	91.5	
										N			0.0		
		C	99.066	149.6	0	0	0.018	0.010	Bus151	A	0.018	0.010	1.1	87.6	
										B	0.020	0.010	1.2	89.2	
										C	0.019	0.012	1.2	85.0	
										N			0.0		
Bus150	0.400	A	99.708	29.8	0	0	0.006	0.002	Bus146	A	-0.019	-0.009	91.4	90.6	
										B	-0.020	-0.011	98.1	88.1	
										C	-0.018	-0.010	90.4	86.2	
										N			0.0		
		B	99.712	-90.1	0	0	0.005	0.002	Bus148	A	-0.019	-0.009	91.4	90.6	
										B	-0.020	-0.011	98.1	88.1	
										C	-0.018	-0.010	90.4	86.2	
										N			0.0		
		C	99.772	149.9	0	0	0.005	0.001	Bus151	A	-0.006	-0.002	26.7	95.0	
										B	-0.005	-0.002	23.7	91.1	
										C	-0.005	-0.001	23.0	96.8	
										N			0.0		
Bus151	33.000	A	99.940	0.0	0	0	0	0	Bus146	A	-0.006	-0.002	0.3	95.3	
										B	-0.006	-0.003	0.3	89.8	
										C	-0.005	-0.002	0.3	91.5	
										N			0.0		
		B	99.924	-120.0	0	0	0	0		A	-0.006	-0.002	0.3	95.3	
										B	-0.006	-0.003	0.3	89.8	
										C	-0.005	-0.002	0.3	91.5	
										N			0.0		
		C	99.945	120.0	0	0	0	0		A	-0.006	-0.002	0.3	95.3	
										B	-0.006	-0.003	0.3	89.8	
										C	-0.005	-0.002	0.3	91.5	
										N			0.0		

Project:  
Location:  
Contract:  
Engineer:  
Filename: unbalance

**ETAP**  
**12.6.0H**  
  
Study Case: ULF

Page: 24  
Date: 05-05-2017  
SN:  
Revision: Base  
Config.: Normal

Bus			Voltage		Generation		Load		Load Flow							XFMR
ID	kV	Phase	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	Phase	MW	Mvar	Amp	% PF	% Tap	
Bus152	33.000	A	99.941	0.0	0	0	0	0	Bus150	A	0.006	0.002	0.3	95.3		
									B	0.006	0.003	0.3	89.8			
									C	0.005	0.002	0.3	91.5			
									N			0.0				
		B	99.925	-120.0	0	0	0	0	Bus146	A	-0.032	-0.014	1.9	91.3		
									B	-0.029	-0.016	1.7	88.2			
									C	-0.030	-0.012	1.7	92.2			
									N			0.0				
		C	99.945	120.0	0	0	0	0	Bus155	A	0.030	0.013	1.7	91.1		
									B	0.027	0.014	1.6	88.9			
									C	0.028	0.012	1.6	92.2			
									N			0.0				
		N							Bus154	A	0.003	0.001	0.2	93.8		
									B	0.002	0.002	0.1	79.6			
									C	0.002	0.001	0.1	93.2			
									N			0.0				
A	99.815	29.9	0	0	0.003	0.001	Bus152	A	-0.003	-0.001	11.9	91.6				
							B	-0.002	-0.001	8.1	89.6					
							C	-0.002	0.000	10.1	99.5					
							N			0.0						
B	99.847	-90.0	0	0	0.002	0.001	Bus158	A	0.024	0.012	1.4	89.9				
							B	0.022	0.011	1.3	88.6					
							C	0.023	0.010	1.3	92.3					
							N			0.0						
C	99.881	149.9	0	0	0.002	0	Bus152	A	-0.030	-0.013	1.7	91.1				
							B	-0.027	-0.014	1.6	88.9					
							C	-0.028	-0.012	1.6	92.2					
							N			0.0						
N							Bus157	A	0.006	0.002	0.3	95.3				
							B	0.006	0.003	0.3	89.8					
							C	0.005	0.002	0.3	91.5					
							N			0.0						
A	99.706	29.8	0	0	0.006	0.002	Bus155	A	-0.006	-0.002	26.7	95.0				
							B	-0.005	-0.002	23.7	91.1					
							C	-0.005	-0.001	23.0	96.8					
							N			0.0						
B	99.710	-90.1	0	0	0.005	0.002	Bus155	A	-0.006	-0.002	26.7	95.0				
							B	-0.005	-0.002	23.7	91.1					
							C	-0.005	-0.001	23.0	96.8					
							N			0.0						
C	99.770	149.9	0	0	0.005	0.001	Bus155	A	-0.006	-0.002	26.7	95.0				
							B	-0.005	-0.002	23.7	91.1					
							C	-0.005	-0.001	23.0	96.8					
							N			0.0						
N							Bus155	A	-0.006	-0.002	26.7	95.0				
							B	-0.005	-0.002	23.7	91.1					
							C	-0.005	-0.001	23.0	96.8					
							N			0.0						



Project:  
Location:  
Contract:  
Engineer:  
Filename: unbalance

ETAP  
12.6.0H  
  
Study Case: ULF

Page: 25  
Date: 05-05-2017  
SN:  
Revision: Base  
Config.: Normal

Bus		Voltage			Generation		Load		Load Flow						XFMR
ID	kV	Phase	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	Phase	MW	Mvar	Amp	% PF	% Tap
Bus158	33.000	A	99.938	0.0	0	0	0	0	Bus155	A	-0.024	-0.012	1.4	89.9	
		B	99.921	-120.0	0	0	0	0		B	-0.022	-0.011	1.3	88.6	
		C	99.942	120.0	0	0	0	0		C	-0.023	-0.010	1.3	92.3	
										N			0.0		
									Bus159	A	0.024	0.012	1.4	89.9	
										B	0.022	0.011	1.3	88.6	
										C	0.023	0.010	1.3	92.3	
										N			0.0		
Bus159	33.000	A	99.936	0.0	0	0	0	0	Bus160	A	0.024	0.012	1.4	89.9	
		B	99.919	-120.0	0	0	0	0		B	0.022	0.011	1.3	88.6	
		C	99.940	120.0	0	0	0	0		C	0.023	0.010	1.3	92.3	
										N			0.0		
									Bus158	A	-0.024	-0.012	1.4	89.9	
										B	-0.022	-0.011	1.3	88.6	
										C	-0.023	-0.010	1.3	92.3	
										N			0.0		
Bus160	33.000	A	99.934	0.0	0	0	0	0	Bus163	A	0.016	0.006	0.9	93.2	
		B	99.918	-120.0	0	0	0	0		B	0.015	0.007	0.9	90.0	
		C	99.939	120.0	0	0	0	0		C	0.015	0.006	0.8	93.1	
										N			0.0		
									Bus159	A	-0.024	-0.012	1.4	90.0	
										B	-0.022	-0.011	1.3	88.6	
										C	-0.023	-0.010	1.3	92.3	
										N			0.0		
									Bus162	A	0.008	0.005	0.5	82.3	
										B	0.007	0.004	0.4	85.6	
										C	0.008	0.004	0.5	90.9	
										N			0.0		
Bus162	0.400	A	99.578	29.8	0	0	0.007	0.004	Bus160	A	-0.007	-0.004	34.7	86.7	
		B	99.623	-90.2	0	0	0.007	0.003		B	-0.007	-0.003	32.5	90.3	
		C	99.525	149.8	0	0	0.009	0.005		C	-0.009	-0.005	43.4	88.0	
										N			7.9		
Bus163	33.000	A	99.933	0.0	0	0	0	0	Bus160	A	-0.016	-0.006	0.9	93.2	
		B	99.916	-120.0	0	0	0	0		B	-0.015	-0.007	0.9	90.0	
		C	99.938	120.0	0	0	0	0		C	-0.015	-0.006	0.8	93.1	
										N			0.0		

Project:  
Location:  
Contract:  
Engineer:  
Filename: unbalance

**ETAP**  
**12.6.0H**  
  
Study Case: ULF

Page: 26  
Date: 05-05-2017  
SN:  
Revision: Base  
Config.: Normal

Bus			Voltage		Generation		Load		Load Flow						XFMR		
ID	kV	Phase	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	Phase	MW	Mvar	Amp	% PF	% Tap		
									Bus166	A	0.004	0.002	0.2	89.5			
										B	0.005	0.002	0.3	95.9			
										C	0.005	0.003	0.3	85.3			
										N			0.0				
											Bus165	A	0.012	0.004	0.7	94.4	
												B	0.009	0.006	0.6	85.9	
												C	0.010	0.003	0.5	96.4	
												N			0.0		
			0.400	A	99.444	29.7	0	0	0.012	0.005	Bus163	A	-0.012	-0.005	56.5	93.6	
					99.620	-90.2	0	0	0.007	0.003		B	-0.007	-0.003	34.7	92.7	
					99.536	149.7	0	0	0.011	0.004		C	-0.011	-0.004	50.8	95.3	
												N			16.8		
		33.000	A	99.932	0.0	0	0	0	0	Bus167	A	0.004	0.002	0.2	89.5		
				99.916	-120.0	0	0	0	0		B	0.005	0.002	0.3	95.9		
				99.937	120.0	0	0	0	0		C	0.005	0.003	0.3	85.3		
											N			0.0			
									Bus163	A	-0.004	-0.002	0.2	89.5			
										B	-0.005	-0.002	0.3	95.9			
										C	-0.005	-0.003	0.3	85.3			
										N			0.0				
			33.000	A	99.932	0.0	0	0	0	0	Bus166	A	-0.004	-0.002	0.2	89.5	
					99.916	-120.0	0	0	0	0		B	-0.005	-0.002	0.3	95.9	
					99.937	120.0	0	0	0	0		C	-0.005	-0.003	0.3	85.3	
												N			0.0		
										Bus168	A	0.004	0.002	0.2	89.5		
											B	0.005	0.002	0.3	95.9		
											C	0.005	0.003	0.3	85.3		
											N			0.0			
	33.000	A	99.932	0.0	0	0	0	0	Bus167	A	-0.004	-0.002	0.2	89.5			
			99.916	-120.0	0	0	0	0		B	-0.005	-0.002	0.3	95.9			
			99.937	120.0	0	0	0	0		C	-0.005	-0.003	0.3	85.3			
										N			0.0				
									Bus171	A	0.004	0.002	0.2	89.5			
										B	0.005	0.002	0.3	95.9			
										C	0.005	0.003	0.3	85.3			
										N			0.0				

Project:  
Location:  
Contract:  
Engineer:  
Filename: unbalance

**ETAP**  
**12.6.0H**  
  
Study Case: ULF

Page: 27  
Date: 05-05-2017  
SN:  
Revision: Base  
Config.: Normal

Bus		Phase	Voltage		Generation		Load		ID	Load Flow				XFMR	
ID	kV		% Mag.	Ang.	MW	Mvar	MW	Mvar		Phase	MW	Mvar	Amp	% PF	% Tap
Bus170	0.400	A	99.642	29.8	0	0	0.004	0.001	Bus171	A	-0.004	-0.001	18.7	95.8	
		B	99.480	-90.2	0	0	0.006	0.002		B	-0.006	-0.002	27.8	92.3	
		C	99.596	149.9	0	0	0.004	0.002		C	-0.004	-0.002	20.4	89.0	
										N			5.6		
Bus171	33.000	A	99.932	0.0	0	0	0	0	Bus168	A	-0.004	-0.002	0.2	89.5	
		B	99.915	-120.0	0	0	0	0		B	-0.005	-0.002	0.3	95.9	
		C	99.936	120.0	0	0	0	0		C	-0.005	-0.003	0.3	85.3	
										N			0.0		
									Bus170	A	0.004	0.002	0.2	89.5	
										B	0.005	0.002	0.3	95.9	
										C	0.005	0.003	0.3	85.3	
										N			0.0		
Bus172	33.000	A	99.937	0.0	0	0	0	0	Bus146	A	-0.155	-0.055	8.7	94.2	
		B	99.921	-120.0	0	0	0	0		B	-0.151	-0.065	8.6	91.8	
		C	99.942	120.0	0	0	0	0		C	-0.144	-0.056	8.1	93.1	
										N			0.0		
									Bus173	A	0.155	0.055	8.7	94.2	
										B	0.151	0.065	8.6	91.8	
										C	0.144	0.056	8.1	93.1	
										N			0.0		
Bus173	33.000	A	99.917	0.0	0	0	0	0	Bus176	A	0.136	0.050	7.6	94.0	
		B	99.900	-120.0	0	0	0	0		B	0.133	0.058	7.6	91.7	
		C	99.922	120.0	0	0	0	0		C	0.127	0.051	7.2	92.9	
										N			0.0		
									Bus172	A	-0.155	-0.055	8.7	94.2	
										B	-0.151	-0.065	8.6	91.8	
										C	-0.144	-0.056	8.1	93.2	
										N			0.0		
									Bus175	A	0.019	0.006	1.0	95.8	
										B	0.018	0.008	1.0	92.2	
										C	0.017	0.006	0.9	94.8	
										N			0.0		
Bus175	0.400	A	98.653	29.3	0	0	0.020	0.005	Bus173	A	-0.020	-0.005	88.6	96.6	
		B	98.752	-90.5	0	0	0.015	0.007		B	-0.015	-0.007	73.3	92.1	
		C	98.682	149.4	0	0	0.019	0.006		C	-0.019	-0.006	85.1	95.5	
										N			17.8		

Project:  
Location:  
Contract:  
Engineer:  
Filename: unbalance

**ETAP**  
**12.6.0H**  
  
Study Case: ULF

Page: 28  
Date: 05-05-2017  
SN:  
Revision: Base  
Config.: Normal

Bus		Voltage			Generation		Load		Load Flow					XFMR	
ID	kV	Phase	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	Phase	MW	Mvar	Amp	% PF	% Tap
Bus176	33.000	A	99.911	0.0	0	0	0	0	Bus173	A	-0.136	-0.050	7.6	94.0	
		B	99.895	-120.0	0	0	0	0		B	-0.133	-0.058	7.6	91.7	
		C	99.917	120.0	0	0	0	0		C	-0.127	-0.051	7.2	92.9	
										N			0.0		
									Bus179	A	0.014	0.005	0.8	94.5	
										B	0.014	0.005	0.8	94.0	
										C	0.013	0.005	0.7	93.7	
										N			0.0		
									Bus180	A	0.123	0.045	6.9	93.9	
										B	0.119	0.053	6.8	91.5	
										C	0.114	0.046	6.5	92.8	
										N			0.0		
Bus178	0.400	A	98.976	29.5	0	0	0.014	0.004	Bus179	A	-0.014	-0.004	62.3	95.2	
		B	98.968	-90.4	0	0	0.013	0.005		B	-0.013	-0.005	62.0	94.4	
		C	99.015	149.6	0	0	0.013	0.004		C	-0.013	-0.004	60.8	94.9	
										N			0.0		
Bus179	33.000	A	99.911	0.0	0	0	0	0	Bus176	A	-0.014	-0.005	0.8	94.5	
		B	99.894	-120.0	0	0	0	0		B	-0.014	-0.005	0.8	94.0	
		C	99.916	120.0	0	0	0	0		C	-0.013	-0.005	0.7	93.7	
										N			0.0		
									Bus178	A	0.014	0.005	0.8	94.5	
										B	0.014	0.005	0.8	94.0	
										C	0.013	0.005	0.7	93.7	
										N			0.0		
									Bus176	A	-0.123	-0.045	6.9	93.9	
										B	-0.119	-0.053	6.8	91.5	
										C	-0.114	-0.046	6.5	92.8	
										N			0.0		
Bus180	33.000	A	99.901	0.0	0	0	0	0	Bus176	A	-0.123	-0.045	6.9	93.9	
		B	99.884	-120.0	0	0	0	0		B	-0.119	-0.053	6.8	91.5	
		C	99.907	120.0	0	0	0	0		C	-0.114	-0.046	6.5	92.8	
										N			0.0		
									Bus194	A	0.077	0.030	4.4	93.1	
										B	0.072	0.033	4.2	91.1	
										C	0.073	0.027	4.1	93.7	
										N			0.0		
									Bus181	A	0.030	0.010	1.7	95.2	
										B	0.024	0.016	1.5	83.8	
										C	0.022	0.007	1.2	94.9	
										N			0.0		

Project:  
Location:  
Contract:  
Engineer:  
Filename: unbalance

**ETAP**  
**12.6.0H**  
  
Study Case: ULF

Page: 29  
Date: 05-05-2017  
SN:  
Revision: Base  
Config.: Normal

Bus		Voltage			Generation		Load		Load Flow						XFMR
ID	kV	Phase	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	Phase	MW	Mvar	Amp	% PF	% Tap
Bus181	33.000	A	99.897	0.0	0	0	0	0	Bus208	A	0.015	0.005	0.8	95.3	
										B	0.023	0.004	1.2	98.2	
										C	0.019	0.011	1.2	86.3	
										N			0.0		
Bus181	33.000	A	99.897	0.0	0	0	0	0	Bus184	A	0.010	0.004	0.6	93.9	
										B	0.009	0.005	0.6	86.7	
										C	0.008	0.003	0.5	92.5	
										N			0.0		
Bus181	33.000	A	99.896	0.0	0	0	0	0	Bus180	A	-0.030	-0.010	1.7	95.2	
										B	-0.024	-0.016	1.5	83.8	
										C	-0.022	-0.007	1.2	94.9	
										N			0.0		
Bus181	33.000	A	99.896	0.0	0	0	0	0	Bus183	A	0.020	0.006	1.1	95.8	
										B	0.015	0.010	0.9	82.0	
										C	0.013	0.004	0.7	96.2	
										N			0.0		
Bus183	0.400	A	99.067	29.6	0	0	0.018	0.009	Bus181	A	-0.018	-0.009	89.0	89.9	
										B	-0.012	-0.007	60.7	86.7	
										C	-0.017	-0.002	74.8	98.9	
										N			0.0		
Bus184	33.000	A	99.896	0.0	0	0	0	0	Bus181	A	-0.010	-0.004	0.6	93.9	
										B	-0.009	-0.005	0.6	86.7	
										C	-0.008	-0.003	0.5	92.5	
										N			0.0		
Bus184	33.000	A	99.896	0.0	0	0	0	0	Bus185	A	0.010	0.004	0.6	93.9	
										B	0.009	0.005	0.6	86.7	
										C	0.008	0.003	0.5	92.5	
										N			0.0		
Bus185	33.000	A	99.896	0.0	0	0	0	0	Bus189	A	0.005	0.002	0.3	92.0	
										B	0.004	0.002	0.2	81.5	
										C	0.004	0.001	0.2	93.8	
										N			0.0		
Bus185	33.000	A	99.896	0.0	0	0	0	0	Bus184	A	-0.010	-0.004	0.6	93.9	
										B	-0.009	-0.005	0.6	86.7	
										C	-0.008	-0.003	0.5	92.5	
										N			0.0		

Project:  
Location:  
Contract:  
Engineer:  
Filename: unbalance

**ETAP**  
**12.6.0H**  
  
Study Case: ULF

Page: 30  
Date: 05-05-2017  
SN:  
Revision: Base  
Config.: Normal

Bus		Voltage			Generation		Load		Load Flow						XFMR
ID	kV	Phase	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	Phase	MW	Mvar	Amp	% PF	% Tap
Bus188										A	0.006	0.002	0.3	95.3	
										B	0.006	0.003	0.3	89.8	
										C	0.005	0.002	0.3	91.5	
										N			0.0		
Bus188	0.400	A	99.662	29.8	0	0	0.006	0.002	Bus185	A	-0.006	-0.002	26.7	95.0	
		B	99.669	-90.1	0	0	0.005	0.002		B	-0.005	-0.002	23.7	91.1	
		C	99.729	149.9	0	0	0.005	0.001		C	-0.005	-0.001	23.0	96.8	
										N			0.0		
Bus189	33.000	A	99.896	0.0	0	0	0	0	Bus193	A	0.000	0.000	0.0	0.0	
		B	99.879	-120.0	0	0	0	0		B	0.000	0.000	0.0	0.0	
		C	99.903	120.0	0	0	0	0		C	0.000	0.000	0.0	0.0	
										N			0.0		
Bus185										A	-0.005	-0.002	0.3	92.0	
										B	-0.004	-0.002	0.2	81.5	
										C	-0.004	-0.001	0.2	93.8	
										N			0.0		
Bus192										A	0.005	0.002	0.3	92.0	
										B	0.004	0.002	0.2	81.5	
										C	0.004	0.001	0.2	93.8	
										N			0.0		
Bus191	0.400	A	99.692	29.9	0	0	0.005	0.002	Bus192	A	-0.005	-0.002	22.6	94.7	
		B	99.784	-90.1	0	0	0.002	0.001		B	-0.002	-0.001	10.8	91.9	
		C	99.723	149.9	0	0	0.004	0.002		C	-0.004	-0.002	19.5	91.0	
										N			12.2		
Bus192	33.000	A	99.895	0.0	0	0	0	0	Bus189	A	-0.005	-0.002	0.3	92.0	
		B	99.878	-120.0	0	0	0	0		B	-0.004	-0.002	0.2	81.5	
		C	99.903	120.0	0	0	0	0		C	-0.004	-0.001	0.2	93.8	
										N			0.0		
Bus191										A	0.005	0.002	0.3	92.0	
										B	0.004	0.002	0.2	81.5	
										C	0.004	0.001	0.2	93.8	
										N			0.0		
Bus193	33.000	A	99.896	0.0	0	0	0	0	Bus189	A	0.000	0.000	0.0	0.0	
		B	99.879	-120.0	0	0	0	0		B	0.000	0.000	0.0	0.0	
		C	99.903	120.0	0	0	0	0		C	0.000	0.000	0.0	0.0	
										N			0.0		

Project:  
Location:  
Contract:  
Engineer:  
Filename: unbalance

**ETAP**  
**12.6.0H**  
  
Study Case: ULF

Page: 31  
Date: 05-05-2017  
SN:  
Revision: Base  
Config.: Normal

Bus		Voltage			Generation		Load		Load Flow						XFMR
ID	kV	Phase	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	Phase	MW	Mvar	Amp	% PF	% Tap
Bus194	33.000	A	99.898	0.0	0	0	0	0	Bus180	A	-0.077	-0.030	4.4	93.1	
		B	99.881	-120.0	0	0	0	0		B	-0.072	-0.033	4.2	91.1	
		C	99.905	120.0	0	0	0	0		C	-0.073	-0.027	4.1	93.7	
										N			0.0		
									Bus195	A	0.077	0.030	4.4	93.1	
										B	0.072	0.033	4.2	91.1	
										C	0.073	0.027	4.1	93.7	
										N			0.0		
Bus195	33.000	A	99.893	0.0	0	0	0	0	Bus196	A	0.077	0.030	4.4	93.1	
		B	99.876	-120.0	0	0	0	0		B	0.072	0.033	4.2	91.1	
		C	99.900	120.0	0	0	0	0		C	0.073	0.027	4.1	93.7	
										N			0.0		
									Bus194	A	-0.077	-0.030	4.4	93.1	
										B	-0.072	-0.033	4.2	91.1	
										C	-0.073	-0.027	4.1	93.7	
										N			0.0		
Bus196	33.000	A	99.893	0.0	0	0	0	0	Bus195	A	-0.077	-0.030	4.4	93.1	
		B	99.876	-120.0	0	0	0	0		B	-0.072	-0.033	4.2	91.1	
		C	99.900	120.0	0	0	0	0		C	-0.073	-0.027	4.1	93.7	
										N			0.0		
									Bus197	A	0.077	0.030	4.4	93.1	
										B	0.072	0.033	4.2	91.1	
										C	0.073	0.027	4.1	93.7	
										N			0.0		
Bus197	33.000	A	99.892	0.0	0	0	0	0	Bus198	A	0.039	0.017	2.2	91.8	
		B	99.875	-120.0	0	0	0	0		B	0.038	0.019	2.3	89.8	
		C	99.899	120.0	0	0	0	0		C	0.037	0.017	2.1	90.6	
										N			0.0		
									Bus209	A	0.038	0.013	2.1	94.3	
										B	0.034	0.014	1.9	92.5	
										C	0.036	0.010	2.0	96.4	
										N			0.0		
									Bus196	A	-0.077	-0.030	4.4	93.1	
										B	-0.072	-0.033	4.2	91.1	
										C	-0.073	-0.027	4.1	93.7	
										N			0.0		

Project:  
Location:  
Contract:  
Engineer:  
Filename: unbalance

**ETAP**  
**12.6.0H**  
  
Study Case: ULF

Page: 32  
Date: 05-05-2017  
SN:  
Revision: Base  
Config.: Normal

Bus			Voltage		Generation		Load		Load Flow							XFMR
ID	kV	Phase	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	Phase	MW	Mvar	Amp	% PF	% Tap	
Bus198	33.000	A	99.891	0.0	0	0	0	0	Bus197	A	-0.039	-0.017	2.2	91.8		
		B	99.874	-120.0	0	0	0	0		B	-0.038	-0.019	2.3	89.8		
		C	99.898	120.0	0	0	0	0		C	-0.037	-0.017	2.1	90.6		
										N			0.0			
										Bus200	A	0.039	0.017	2.2	91.8	
									B		0.038	0.019	2.3	89.8		
									C		0.037	0.017	2.1	90.6		
									N				0.0			
Bus200	0.400	A	99.000	29.3	0	0	0.039	0.017	Bus198	A	-0.039	-0.017	185.9	91.8		
		B	99.008	-90.6	0	0	0.037	0.017		B	-0.037	-0.017	178.6	90.6		
		C	99.085	149.4	0	0	0.038	0.015		C	-0.038	-0.015	177.7	92.6		
										N			0.0			
Bus201	33.000	A	99.889	0.0	0	0	0	0	Bus204	A	0.000	0.000	0.0	0.0		
		B	99.872	-120.0	0	0	0	0		B	0.000	0.000	0.0	0.0		
		C	99.896	120.0	0	0	0	0		C	0.000	0.000	0.0	0.0		
										N			0.0			
										Bus209	A	-0.004	-0.003	0.3	81.7	
									B		-0.005	-0.002	0.3	95.1		
									C		-0.006	-0.003	0.3	90.9		
									N				0.0			
								Bus203	A	0.004	0.003	0.3	81.7			
							B		0.005	0.002	0.3	95.1				
							C		0.006	0.003	0.3	90.9				
							N				0.0					
Bus203	0.400	A	99.705	29.9	0	0	0.004	0.002	Bus201	A	-0.004	-0.002	18.4	91.6		
		B	99.700	-90.1	0	0	0.005	0.001		B	-0.005	-0.001	24.0	97.1		
		C	99.653	149.9	0	0	0.005	0.003		C	-0.005	-0.003	24.7	87.0		
										N			0.0			
Bus204	33.000	A	99.889	0.0	0	0	0	0	Bus201	A	0.000	0.000	0.0	0.0		
		B	99.872	-120.0	0	0	0	0		B	0.000	0.000	0.0	0.0		
		C	99.896	120.0	0	0	0	0		C	0.000	0.000	0.0	0.0		
										N			0.0			
										Bus205	A	0.000	0.000	0.0	0.0	
									B		0.000	0.000	0.0	0.0		
									C		0.000	0.000	0.0	0.0		
									N				0.0			



Project:  
Location:  
Contract:  
Engineer:  
Filename: unbalance

**ETAP**  
**12.6.0H**  
  
Study Case: ULF

Page: 33  
Date: 05-05-2017  
SN:  
Revision: Base  
Config.: Normal

Bus		Voltage			Generation		Load		Load Flow						XFMR
ID	kV	Phase	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	Phase	MW	Mvar	Amp	% PF	% Tap
Bus205	33.000								Bus206	A	0.000	0.000	0.0	0.0	
									B	0.000	0.000	0.0	0.0		
									C	0.000	0.000	0.0	0.0		
									N			0.0			
		A	0.000	0.000	0.0	0.0									
		B	0.000	0.000	0.0	0.0									
		C	0.000	0.000	0.0	0.0									
Bus206	33.000								Bus204	A	0.000	0.000	0.0	0.0	
									B	0.000	0.000	0.0	0.0		
									C	0.000	0.000	0.0	0.0		
									N			0.0			
		A	0.000	0.000	0.0	0.0									
		B	0.000	0.000	0.0	0.0									
		C	0.000	0.000	0.0	0.0									
Bus208	0.400								Bus180	A	-0.019	-0.002	81.0	99.6	
									B	-0.023	-0.008	105.2	94.4		
									C	-0.015	-0.009	75.4	87.1		
									N			0.0			
		A	-0.019	-0.002	81.0	99.6									
		B	-0.023	-0.008	105.2	94.4									
		C	-0.015	-0.009	75.4	87.1									
Bus209	33.000								Bus201	A	0.004	0.003	0.3	81.7	
									B	0.005	0.002	0.3	95.1		
									C	0.006	0.003	0.3	90.9		
									N			0.0			
		A	0.004	0.003	0.3	81.7									
		B	0.005	0.002	0.3	95.1									
		C	0.006	0.003	0.3	90.9									
Bus211	0.400								Bus197	A	-0.038	-0.013	2.1	94.3	
									B	-0.034	-0.014	1.9	92.5		
									C	-0.036	-0.010	2.0	96.4		
									N			0.0			
		A	-0.038	-0.013	2.1	94.3									
		B	-0.034	-0.014	1.9	92.5									
		C	-0.036	-0.010	2.0	96.4									
Bus211	0.400								Bus211	A	0.034	0.011	1.9	95.6	
									B	0.029	0.012	1.7	92.1		
									C	0.030	0.007	1.6	97.3		
									N			0.0			
		A	0.034	0.011	1.9	95.6									
		B	0.029	0.012	1.7	92.1									
		C	0.030	0.007	1.6	97.3									
Bus211	0.400								Bus209	A	-0.032	-0.012	148.7	93.8	
									B	-0.028	-0.009	127.5	95.6		
									C	-0.033	-0.007	146.0	98.0		
									N			0.0			
		A	-0.032	-0.012	148.7	93.8									
		B	-0.028	-0.009	127.5	95.6									
		C	-0.033	-0.007	146.0	98.0									

\* Indicates a voltage regulated bus (voltage controlled or swing type machine connected to it)

# Indicates a bus with a load mismatch of more than 0.1 MVA

+ The power flows across center-tap transformers correspond to the phases of the From side.