

Project:	ETAP	Page:	1
Location:	12.6.0H	Date:	05-03-2017
Contract:		SN:	
Engineer:		Revision:	Base
Filename:	unbalance	Config.:	Normal

### Electrical Transient Analyzer Program

#### Unbalanced Load Flow Analysis

Loading Category (1):	Design
Generation Category (1):	Design
Load Diversity Factor:	None

	Swing	V-Control	Load	Total				
Number of Buses:	1	0	148	149				
	XFMR2	XFMR3	Reactor	Line	Cable	Impedance	Tie PD	Total
Number of Branches:	55	0	0	0	56	37	0	148

Method of Solution:	Current Injection Method
Maximum No. of Iteration:	99
Precision of Solution:	0.000100
System Frequency:	50 Hz
Unit System:	English
Project Filename:	unbalance
Output Filename:	C:\Users\JUNDI\Google Drive\graduation project\unbalance\Untitled.UL1

Project:  
Location:  
Contract:  
Engineer:  
Filename: unbalance

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

Page: 2  
Date: 05-03-2017  
SN:  
Revision: Base  
Config.: Normal

### Adjustments

<u>Tolerance</u>	<u>Apply Adjustments</u>	<u>Individual /Global</u>	<u>Percent</u>
Transformer Impedance:	Yes	Individual	
Reactor Impedance:	Yes	Individual	
Overload Heater Resistance:	No		
Transmission Line Length:	No		
Cable Length:	No		

  

<u>Temperature Correction</u>	<u>Apply Adjustments</u>	<u>Individual /Global</u>	<u>Degree C</u>
Transmission Line Resistance:	Yes	Individual	
Cable Resistance:	Yes	Individual	

Project:  
Location:  
Contract:  
Engineer:  
Filename: unbalance

ETAP  
12.6.0H  
  
Study Case: ULF

Page: 3  
Date: 05-03-2017  
SN:  
Revision: Base  
Config.: Normal

**Bus Input Data**

Bus					Initial Voltage			Generation		Load		Mvar Limits	
ID	Conn.	Type	kV	Sub-sys	Ph	% Mag.	Ang.	MW	Mvar	MW	Mvar	Max.	Min.
Bus1	3-Phase	Swing	33.000	1	A	100.0	0.0	0.939	0.390	0	0	0.000	0.000
					B	100.0	-120.0	0.928	0.413	0	0		
					C	100.0	120.0	0.914	0.392	0	0		
Bus2	3-Phase	Load	33.000	1	A	100.0	0.0	0	0	0	0	0.000	0.000
					B	100.0	-120.0	0	0	0	0		
					C	100.0	120.0	0	0	0	0		
Bus3	3-Phase	Load	33.000	1	A	100.0	0.0	0	0	0	0	0.000	0.000
					B	100.0	-120.0	0	0	0	0		
					C	100.0	120.0	0	0	0	0		
Bus4	3-Phase	Load	33.000	1	A	100.0	0.0	0	0	0	0	0.000	0.000
					B	100.0	-120.0	0	0	0	0		
					C	100.0	120.0	0	0	0	0		
Bus5	3-Phase	Load	0.400	1	A	100.0	30.0	0	0	0.008	0.004	0.000	0.000
					B	100.0	-90.0	0	0	0.008	0.005		
					C	100.0	150.0	0	0	0.007	0.005		
Bus6	3-Phase	Load	33.000	1	A	100.0	0.0	0	0	0	0	0.000	0.000
					B	100.0	-120.0	0	0	0	0		
					C	100.0	120.0	0	0	0	0		
Bus7	3-Phase	Load	33.000	1	A	100.0	0.0	0	0	0	0	0.000	0.000
					B	100.0	-120.0	0	0	0	0		
					C	100.0	120.0	0	0	0	0		
Bus8	3-Phase	Load	0.400	1	A	100.0	30.0	0	0	0.017	0.008	0.000	0.000
					B	100.0	-90.0	0	0	0.017	0.008		
					C	100.0	150.0	0	0	0.021	0.011		
Bus9	3-Phase	Load	33.000	1	A	100.0	0.0	0	0	0	0	0.000	0.000
					B	100.0	-120.0	0	0	0	0		
					C	100.0	120.0	0	0	0	0		
Bus10	3-Phase	Load	33.000	1	A	100.0	0.0	0	0	0	0	0.000	0.000
					B	100.0	-120.0	0	0	0	0		
					C	100.0	120.0	0	0	0	0		
Bus11	3-Phase	Load	33.000	1	A	100.0	0.0	0	0	0	0	0.000	0.000
					B	100.0	-120.0	0	0	0	0		
					C	100.0	120.0	0	0	0	0		
Bus12	3-Phase	Load	0.400	1	A	100.0	30.0	0	0	0.006	0.002	0.000	0.000
					B	100.0	-90.0	0	0	0.005	0.002		
					C	100.0	150.0	0	0	0.006	0.002		

Project:  
Location:  
Contract:  
Engineer:  
Filename: unbalance

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

Page: 4  
Date: 05-03-2017  
SN:  
Revision: Base  
Config.: Normal

Bus					Initial Voltage			Generation		Load		Mvar Limits	
ID	Conn.	Type	kV	Sub-sys	Ph	% Mag.	Ang.	MW	Mvar	MW	Mvar	Max.	Min.
Bus13	3-Phase	Load	33.000	1	A	100.0	0.0	0	0	0	0	0.000	0.000
					B	100.0	-120.0	0	0	0	0		
					C	100.0	120.0	0	0	0	0		
Bus14	3-Phase	Load	0.400	1	A	100.0	30.0	0	0	0.012	0.005	0.000	0.000
					B	100.0	-90.0	0	0	0.007	0.003		
					C	100.0	150.0	0	0	0.011	0.004		
Bus15	3-Phase	Load	33.000	1	A	100.0	0.0	0	0	0	0	0.000	0.000
					B	100.0	-120.0	0	0	0	0		
					C	100.0	120.0	0	0	0	0		
Bus17	3-Phase	Load	33.000	1	A	100.0	0.0	0	0	0	0	0.000	0.000
					B	100.0	-120.0	0	0	0	0		
					C	100.0	120.0	0	0	0	0		
Bus18	3-Phase	Load	33.000	1	A	100.0	0.0	0	0	0	0	0.000	0.000
					B	100.0	-120.0	0	0	0	0		
					C	100.0	120.0	0	0	0	0		
Bus19	3-Phase	Load	0.400	1	A	100.0	30.0	0	0	0.007	0.004	0.000	0.000
					B	100.0	-90.0	0	0	0.007	0.003		
					C	100.0	150.0	0	0	0.009	0.005		
Bus20	3-Phase	Load	0.400	1	A	100.0	30.0	0	0	0.034	0.014	0.000	0.000
					B	100.0	-90.0	0	0	0.032	0.014		
					C	100.0	150.0	0	0	0.031	0.015		
Bus21	3-Phase	Load	33.000	1	A	100.0	0.0	0	0	0	0	0.000	0.000
					B	100.0	-120.0	0	0	0	0		
					C	100.0	120.0	0	0	0	0		
Bus22	3-Phase	Load	0.400	1	A	100.0	30.0	0	0	0.024	0.008	0.000	0.000
					B	100.0	-90.0	0	0	0.023	0.008		
					C	100.0	150.0	0	0	0.025	0.006		
Bus24	3-Phase	Load	33.000	1	A	100.0	0.0	0	0	0	0	0.000	0.000
					B	100.0	-120.0	0	0	0	0		
					C	100.0	120.0	0	0	0	0		
Bus25	3-Phase	Load	0.400	1	A	100.0	30.0	0	0	0.031	0.016	0.000	0.000
					B	100.0	-90.0	0	0	0.024	0.010		
					C	100.0	150.0	0	0	0.027	0.012		
Bus26	3-Phase	Load	33.000	1	A	100.0	0.0	0	0	0	0	0.000	0.000
					B	100.0	-120.0	0	0	0	0		
					C	100.0	120.0	0	0	0	0		
Bus27	3-Phase	Load	0.400	1	A	100.0	30.0	0	0	0.006	0.002	0.000	0.000
					B	100.0	-90.0	0	0	0.005	0.002		
					C	100.0	150.0	0	0	0.006	0.002		
Bus28	3-Phase	Load	33.000	1	A	100.0	0.0	0	0	0	0	0.000	0.000
					B	100.0	-120.0	0	0	0	0		
					C	100.0	120.0	0	0	0	0		

Project:  
Location:  
Contract:  
Engineer:  
Filename: unbalance

**ETAP**  
**12.6.0H**

Study Case: ULF

Page: 5  
Date: 05-03-2017  
SN:  
Revision: Base  
Config.: Normal

Bus					Initial Voltage			Generation		Load		Mvar Limits	
ID	Conn.	Type	kV	Sub-sys	Ph	% Mag.	Ang.	MW	Mvar	MW	Mvar	Max.	Min.
Bus30	3-Phase	Load	0.400	1	A	100.0	30.0	0	0	0.021	0.006	0.000	0.000
					B	100.0	-90.0	0	0	0.019	0.004		
					C	100.0	150.0	0	0	0.016	0.005		
Bus31	3-Phase	Load	33.000	1	A	100.0	0.0	0	0	0	0	0.000	0.000
					B	100.0	-120.0	0	0	0	0		
					C	100.0	120.0	0	0	0	0		
Bus32	3-Phase	Load	33.000	1	A	100.0	0.0	0	0	0	0	0.000	0.000
					B	100.0	-120.0	0	0	0	0		
					C	100.0	120.0	0	0	0	0		
Bus34	3-Phase	Load	0.400	1	A	100.0	30.0	0	0	0.038	0.011	0.000	0.000
					B	100.0	-90.0	0	0	0.038	0.011		
					C	100.0	150.0	0	0	0.041	0.013		
Bus35	3-Phase	Load	33.000	1	A	100.0	0.0	0	0	0	0	0.000	0.000
					B	100.0	-120.0	0	0	0	0		
					C	100.0	120.0	0	0	0	0		
Bus37	3-Phase	Load	0.400	1	A	100.0	30.0	0	0	0.008	0.004	0.000	0.000
					B	100.0	-90.0	0	0	0.008	0.005		
					C	100.0	150.0	0	0	0.007	0.005		
Bus38	3-Phase	Load	33.000	1	A	100.0	0.0	0	0	0	0	0.000	0.000
					B	100.0	-120.0	0	0	0	0		
					C	100.0	120.0	0	0	0	0		
Bus41	3-Phase	Load	0.400	1	A	100.0	30.0	0	0	0.031	0.016	0.000	0.000
					B	100.0	-90.0	0	0	0.024	0.010		
					C	100.0	150.0	0	0	0.027	0.012		
Bus42	3-Phase	Load	33.000	1	A	100.0	0.0	0	0	0	0	0.000	0.000
					B	100.0	-120.0	0	0	0	0		
					C	100.0	120.0	0	0	0	0		
Bus43	3-Phase	Load	33.000	1	A	100.0	0.0	0	0	0	0	0.000	0.000
					B	100.0	-120.0	0	0	0	0		
					C	100.0	120.0	0	0	0	0		
Bus44	3-Phase	Load	33.000	1	A	100.0	0.0	0	0	0	0	0.000	0.000
					B	100.0	-120.0	0	0	0	0		
					C	100.0	120.0	0	0	0	0		
Bus46	3-Phase	Load	0.400	1	A	100.0	30.0	0	0	0.018	0.006	0.000	0.000
					B	100.0	-90.0	0	0	0.019	0.004		
					C	100.0	150.0	0	0	0.017	0.003		
Bus47	3-Phase	Load	33.000	1	A	100.0	0.0	0	0	0	0	0.000	0.000
					B	100.0	-120.0	0	0	0	0		
					C	100.0	120.0	0	0	0	0		
Bus51	3-Phase	Load	33.000	1	A	100.0	0.0	0	0	0	0	0.000	0.000
					B	100.0	-120.0	0	0	0	0		
					C	100.0	120.0	0	0	0	0		

Project:  
Location:  
Contract:  
Engineer:  
Filename: unbalance

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

Page: 6  
Date: 05-03-2017  
SN:  
Revision: Base  
Config.: Normal

Bus					Initial Voltage			Generation		Load		Mvar Limits	
ID	Conn.	Type	kV	Sub-sys	Ph	% Mag.	Ang.	MW	Mvar	MW	Mvar	Max.	Min.
Bus52	3-Phase	Load	0.400	1	A	100.0	30.0	0	0	0.004	0.001	0.000	0.000
					B	100.0	-90.0	0	0	0.006	0.002		
					C	100.0	150.0	0	0	0.004	0.002		
Bus53	3-Phase	Load	33.000	1	A	100.0	0.0	0	0	0	0	0.000	0.000
					B	100.0	-120.0	0	0	0	0		
					C	100.0	120.0	0	0	0	0		
Bus54	3-Phase	Load	33.000	1	A	100.0	0.0	0	0	0	0	0.000	0.000
					B	100.0	-120.0	0	0	0	0		
					C	100.0	120.0	0	0	0	0		
Bus56	3-Phase	Load	0.400	1	A	100.0	30.0	0	0	0.006	0.002	0.000	0.000
					B	100.0	-90.0	0	0	0.005	0.002		
					C	100.0	150.0	0	0	0.006	0.002		
Bus57	3-Phase	Load	33.000	1	A	100.0	0.0	0	0	0	0	0.000	0.000
					B	100.0	-120.0	0	0	0	0		
					C	100.0	120.0	0	0	0	0		
Bus59	3-Phase	Load	0.400	1	A	100.0	30.0	0	0	0.031	0.016	0.000	0.000
					B	100.0	-90.0	0	0	0.024	0.010		
					C	100.0	150.0	0	0	0.027	0.012		
Bus60	3-Phase	Load	33.000	1	A	100.0	0.0	0	0	0	0	0.000	0.000
					B	100.0	-120.0	0	0	0	0		
					C	100.0	120.0	0	0	0	0		
Bus62	3-Phase	Load	0.400	1	A	100.0	30.0	0	0	0.023	0.011	0.000	0.000
					B	100.0	-90.0	0	0	0.027	0.012		
					C	100.0	150.0	0	0	0.022	0.011		
Bus63	3-Phase	Load	33.000	1	A	100.0	0.0	0	0	0	0	0.000	0.000
					B	100.0	-120.0	0	0	0	0		
					C	100.0	120.0	0	0	0	0		
Bus64	3-Phase	Load	33.000	1	A	100.0	0.0	0	0	0	0	0.000	0.000
					B	100.0	-120.0	0	0	0	0		
					C	100.0	120.0	0	0	0	0		
Bus66	3-Phase	Load	0.400	1	A	100.0	30.0	0	0	0.041	0.018	0.000	0.000
					B	100.0	-90.0	0	0	0.036	0.014		
					C	100.0	150.0	0	0	0.038	0.018		
Bus68	3-Phase	Load	0.400	1	A	100.0	30.0	0	0	0.023	0.009	0.000	0.000
					B	100.0	-90.0	0	0	0.026	0.007		
					C	100.0	150.0	0	0	0.020	0.005		
Bus69	3-Phase	Load	33.000	1	A	100.0	0.0	0	0	0	0	0.000	0.000
					B	100.0	-120.0	0	0	0	0		
					C	100.0	120.0	0	0	0	0		
Bus70	3-Phase	Load	33.000	1	A	100.0	0.0	0	0	0	0	0.000	0.000
					B	100.0	-120.0	0	0	0	0		
					C	100.0	120.0	0	0	0	0		

Project:  
Location:  
Contract:  
Engineer:  
Filename: unbalance

**ETAP**  
**12.6.0H**

Study Case: ULF

Page: 7  
Date: 05-03-2017  
SN:  
Revision: Base  
Config.: Normal

Bus					Initial Voltage			Generation		Load		Mvar Limits	
ID	Conn.	Type	kV	Sub-sys	Ph	% Mag.	Ang.	MW	Mvar	MW	Mvar	Max.	Min.
Bus72	3-Phase	Load	0.400	1	A	100.0	30.0	0	0	0.038	0.011	0.000	0.000
					B	100.0	-90.0	0	0	0.038	0.011		
					C	100.0	150.0	0	0	0.041	0.013		
Bus73	3-Phase	Load	33.000	1	A	100.0	0.0	0	0	0	0	0.000	0.000
					B	100.0	-120.0	0	0	0	0		
					C	100.0	120.0	0	0	0	0		
Bus75	3-Phase	Load	0.400	1	A	100.0	30.0	0	0	0.020	0.008	0.000	0.000
					B	100.0	-90.0	0	0	0.015	0.006		
					C	100.0	150.0	0	0	0.011	0.005		
Bus76	3-Phase	Load	33.000	1	A	100.0	0.0	0	0	0	0	0.000	0.000
					B	100.0	-120.0	0	0	0	0		
					C	100.0	120.0	0	0	0	0		
Bus78	3-Phase	Load	0.400	1	A	100.0	30.0	0	0	0.006	0.005	0.000	0.000
					B	100.0	-90.0	0	0	0.004	0.003		
					C	100.0	150.0	0	0	0.005	0.004		
Bus79	3-Phase	Load	33.000	1	A	100.0	0.0	0	0	0	0	0.000	0.000
					B	100.0	-120.0	0	0	0	0		
					C	100.0	120.0	0	0	0	0		
Bus81	3-Phase	Load	0.400	1	A	100.0	30.0	0	0	0.018	0.005	0.000	0.000
					B	100.0	-90.0	0	0	0.014	0.002		
					C	100.0	150.0	0	0	0.020	0.006		
Bus82	3-Phase	Load	33.000	1	A	100.0	0.0	0	0	0	0	0.000	0.000
					B	100.0	-120.0	0	0	0	0		
					C	100.0	120.0	0	0	0	0		
Bus83	3-Phase	Load	33.000	1	A	100.0	0.0	0	0	0	0	0.000	0.000
					B	100.0	-120.0	0	0	0	0		
					C	100.0	120.0	0	0	0	0		
Bus85	3-Phase	Load	0.400	1	A	100.0	30.0	0	0	0.018	0.006	0.000	0.000
					B	100.0	-90.0	0	0	0.019	0.004		
					C	100.0	150.0	0	0	0.017	0.003		
Bus86	3-Phase	Load	33.000	1	A	100.0	0.0	0	0	0	0	0.000	0.000
					B	100.0	-120.0	0	0	0	0		
					C	100.0	120.0	0	0	0	0		
Bus87	3-Phase	Load	33.000	1	A	100.0	0.0	0	0	0	0	0.000	0.000
					B	100.0	-120.0	0	0	0	0		
					C	100.0	120.0	0	0	0	0		
Bus89	3-Phase	Load	0.400	1	A	100.0	30.0	0	0	0.019	0.007	0.000	0.000
					B	100.0	-90.0	0	0	0.013	0.004		
					C	100.0	150.0	0	0	0.015	0.006		
Bus90	3-Phase	Load	33.000	1	A	100.0	0.0	0	0	0	0	0.000	0.000
					B	100.0	-120.0	0	0	0	0		
					C	100.0	120.0	0	0	0	0		

Project:  
Location:  
Contract:  
Engineer:  
Filename: unbalance

**ETAP**  
**12.6.0H**

Study Case: ULF

Page: 8  
Date: 05-03-2017  
SN:  
Revision: Base  
Config.: Normal

Bus					Initial Voltage			Generation		Load		Mvar Limits	
ID	Conn.	Type	kV	Sub-sys	Ph	% Mag.	Ang.	MW	Mvar	MW	Mvar	Max.	Min.
Bus92	3-Phase	Load	0.400	1	A	100.0	30.0	0	0	0.028	0.008	0.000	0.000
					B	100.0	-90.0	0	0	0.031	0.013		
					C	100.0	150.0	0	0	0.026	0.012		
Bus93	3-Phase	Load	33.000	1	A	100.0	0.0	0	0	0	0	0.000	0.000
					B	100.0	-120.0	0	0	0	0		
					C	100.0	120.0	0	0	0	0		
Bus95	3-Phase	Load	0.400	1	A	100.0	30.0	0	0	0.008	0.004	0.000	0.000
					B	100.0	-90.0	0	0	0.008	0.005		
					C	100.0	150.0	0	0	0.007	0.005		
Bus96	3-Phase	Load	33.000	1	A	100.0	0.0	0	0	0	0	0.000	0.000
					B	100.0	-120.0	0	0	0	0		
					C	100.0	120.0	0	0	0	0		
Bus98	3-Phase	Load	0.400	1	A	100.0	30.0	0	0	0.021	0.006	0.000	0.000
					B	100.0	-90.0	0	0	0.019	0.004		
					C	100.0	150.0	0	0	0.016	0.005		
Bus99	3-Phase	Load	33.000	1	A	100.0	0.0	0	0	0	0	0.000	0.000
					B	100.0	-120.0	0	0	0	0		
					C	100.0	120.0	0	0	0	0		
Bus101	3-Phase	Load	0.400	1	A	100.0	30.0	0	0	0.022	0.022	0.000	0.000
					B	100.0	-90.0	0	0	0.026	0.026		
					C	100.0	150.0	0	0	0.020	0.027		
Bus102	3-Phase	Load	33.000	1	A	100.0	0.0	0	0	0	0	0.000	0.000
					B	100.0	-120.0	0	0	0	0		
					C	100.0	120.0	0	0	0	0		
Bus103	3-Phase	Load	33.000	1	A	100.0	0.0	0	0	0	0	0.000	0.000
					B	100.0	-120.0	0	0	0	0		
					C	100.0	120.0	0	0	0	0		
Bus105	3-Phase	Load	0.400	1	A	100.0	30.0	0	0	0.020	0.008	0.000	0.000
					B	100.0	-90.0	0	0	0.015	0.006		
					C	100.0	150.0	0	0	0.011	0.005		
Bus106	3-Phase	Load	33.000	1	A	100.0	0.0	0	0	0	0	0.000	0.000
					B	100.0	-120.0	0	0	0	0		
					C	100.0	120.0	0	0	0	0		
Bus108	3-Phase	Load	0.400	1	A	100.0	30.0	0	0	0.022	0.007	0.000	0.000
					B	100.0	-90.0	0	0	0.020	0.008		
					C	100.0	150.0	0	0	0.025	0.006		
Bus113	3-Phase	Load	33.000	1	A	100.0	0.0	0	0	0	0	0.000	0.000
					B	100.0	-120.0	0	0	0	0		
					C	100.0	120.0	0	0	0	0		
Bus114	3-Phase	Load	33.000	1	A	100.0	0.0	0	0	0	0	0.000	0.000
					B	100.0	-120.0	0	0	0	0		
					C	100.0	120.0	0	0	0	0		



Project:  
Location:  
Contract:  
Engineer:  
Filename: unbalance

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

Page: 9  
Date: 05-03-2017  
SN:  
Revision: Base  
Config.: Normal

Bus					Initial Voltage			Generation		Load		Mvar Limits	
ID	Conn.	Type	kV	Sub-sys	Ph	% Mag.	Ang.	MW	Mvar	MW	Mvar	Max.	Min.
Bus116	3-Phase	Load	0.400	1	A	100.0	30.0	0	0	0.006	0.003	0.000	0.000
					B	100.0	-90.0	0	0	0.012	0.005		
					C	100.0	150.0	0	0	0.014	0.006		
Bus119	3-Phase	Load	0.400	1	A	100.0	30.0	0	0	0.007	0.002	0.000	0.000
					B	100.0	-90.0	0	0	0.011	0.002		
					C	100.0	150.0	0	0	0.006	0.003		
Bus120	3-Phase	Load	33.000	1	A	100.0	0.0	0	0	0	0	0.000	0.000
					B	100.0	-120.0	0	0	0	0		
					C	100.0	120.0	0	0	0	0		
Bus121	3-Phase	Load	33.000	1	A	100.0	0.0	0	0	0	0	0.000	0.000
					B	100.0	-120.0	0	0	0	0		
					C	100.0	120.0	0	0	0	0		
Bus124	3-Phase	Load	33.000	1	A	100.0	0.0	0	0	0	0	0.000	0.000
					B	100.0	-120.0	0	0	0	0		
					C	100.0	120.0	0	0	0	0		
Bus125	3-Phase	Load	0.400	1	A	100.0	30.0	0	0	0.029	0.007	0.000	0.000
					B	100.0	-90.0	0	0	0.029	0.011		
					C	100.0	150.0	0	0	0.027	0.010		
Bus126	3-Phase	Load	33.000	1	A	100.0	0.0	0	0	0	0	0.000	0.000
					B	100.0	-120.0	0	0	0	0		
					C	100.0	120.0	0	0	0	0		
Bus127	3-Phase	Load	33.000	1	A	100.0	0.0	0	0	0	0	0.000	0.000
					B	100.0	-120.0	0	0	0	0		
					C	100.0	120.0	0	0	0	0		
Bus129	3-Phase	Load	0.400	1	A	100.0	30.0	0	0	0.010	0.003	0.000	0.000
					B	100.0	-90.0	0	0	0.012	0.002		
					C	100.0	150.0	0	0	0.013	0.002		
Bus132	3-Phase	Load	33.000	1	A	100.0	0.0	0	0	0	0	0.000	0.000
					B	100.0	-120.0	0	0	0	0		
					C	100.0	120.0	0	0	0	0		
Bus133	3-Phase	Load	0.400	1	A	100.0	30.0	0	0	0.010	0.004	0.000	0.000
					B	100.0	-90.0	0	0	0.013	0.004		
					C	100.0	150.0	0	0	0.016	0.005		
Bus134	3-Phase	Load	33.000	1	A	100.0	0.0	0	0	0	0	0.000	0.000
					B	100.0	-120.0	0	0	0	0		
					C	100.0	120.0	0	0	0	0		
Bus135	3-Phase	Load	33.000	1	A	100.0	0.0	0	0	0	0	0.000	0.000
					B	100.0	-120.0	0	0	0	0		
					C	100.0	120.0	0	0	0	0		
Bus138	3-Phase	Load	33.000	1	A	100.0	0.0	0	0	0	0	0.000	0.000
					B	100.0	-120.0	0	0	0	0		
					C	100.0	120.0	0	0	0	0		

Project:  
Location:  
Contract:  
Engineer:  
Filename: unbalance

**ETAP**  
**12.6.0H**

Study Case: ULF

Page: 10  
Date: 05-03-2017  
SN:  
Revision: Base  
Config.: Normal

Bus					Initial Voltage			Generation		Load		Mvar Limits	
ID	Conn.	Type	kV	Sub-sys	Ph	% Mag.	Ang.	MW	Mvar	MW	Mvar	Max.	Min.
Bus139	3-Phase	Load	0.400	1	A	100.0	30.0	0	0	0.019	0.010	0.000	0.000
					B	100.0	-90.0	0	0	0.024	0.012		
					C	100.0	150.0	0	0	0.022	0.011		
Bus142	3-Phase	Load	33.000	1	A	100.0	0.0	0	0	0	0	0.000	0.000
					B	100.0	-120.0	0	0	0	0		
					C	100.0	120.0	0	0	0	0		
Bus143	3-Phase	Load	0.400	1	A	100.0	30.0	0	0	0.024	0.008	0.000	0.000
					B	100.0	-90.0	0	0	0.023	0.008		
					C	100.0	150.0	0	0	0.025	0.006		
Bus145	3-Phase	Load	33.000	1	A	100.0	0.0	0	0	0	0	0.000	0.000
					B	100.0	-120.0	0	0	0	0		
					C	100.0	120.0	0	0	0	0		
Bus146	3-Phase	Load	33.000	1	A	100.0	0.0	0	0	0	0	0.000	0.000
					B	100.0	-120.0	0	0	0	0		
					C	100.0	120.0	0	0	0	0		
Bus148	3-Phase	Load	0.400	1	A	100.0	30.0	0	0	0.019	0.009	0.000	0.000
					B	100.0	-90.0	0	0	0.019	0.013		
					C	100.0	150.0	0	0	0.019	0.009		
Bus150	3-Phase	Load	0.400	1	A	100.0	30.0	0	0	0.006	0.002	0.000	0.000
					B	100.0	-90.0	0	0	0.005	0.002		
					C	100.0	150.0	0	0	0.006	0.002		
Bus151	3-Phase	Load	33.000	1	A	100.0	0.0	0	0	0	0	0.000	0.000
					B	100.0	-120.0	0	0	0	0		
					C	100.0	120.0	0	0	0	0		
Bus152	3-Phase	Load	33.000	1	A	100.0	0.0	0	0	0	0	0.000	0.000
					B	100.0	-120.0	0	0	0	0		
					C	100.0	120.0	0	0	0	0		
Bus154	3-Phase	Load	0.400	1	A	100.0	30.0	0	0	0.002	0.001	0.000	0.000
					B	100.0	-90.0	0	0	0.002	0.001		
					C	100.0	150.0	0	0	0.003	0.001		
Bus155	3-Phase	Load	33.000	1	A	100.0	0.0	0	0	0	0	0.000	0.000
					B	100.0	-120.0	0	0	0	0		
					C	100.0	120.0	0	0	0	0		
Bus157	3-Phase	Load	0.400	1	A	100.0	30.0	0	0	0.006	0.002	0.000	0.000
					B	100.0	-90.0	0	0	0.005	0.002		
					C	100.0	150.0	0	0	0.006	0.002		
Bus158	3-Phase	Load	33.000	1	A	100.0	0.0	0	0	0	0	0.000	0.000
					B	100.0	-120.0	0	0	0	0		
					C	100.0	120.0	0	0	0	0		
Bus159	3-Phase	Load	33.000	1	A	100.0	0.0	0	0	0	0	0.000	0.000
					B	100.0	-120.0	0	0	0	0		
					C	100.0	120.0	0	0	0	0		

Project:  
Location:  
Contract:  
Engineer:  
Filename: unbalance

**ETAP**  
**12.6.0H**

Study Case: ULF

Page: 11  
Date: 05-03-2017  
SN:  
Revision: Base  
Config.: Normal

Bus					Initial Voltage			Generation		Load		Mvar Limits	
ID	Conn.	Type	kV	Sub-sys	Ph	% Mag.	Ang.	MW	Mvar	MW	Mvar	Max.	Min.
Bus160	3-Phase	Load	33.000	1	A	100.0	0.0	0	0	0	0	0.000	0.000
					B	100.0	-120.0	0	0	0	0		
					C	100.0	120.0	0	0	0	0		
Bus162	3-Phase	Load	0.400	1	A	100.0	30.0	0	0	0.007	0.004	0.000	0.000
					B	100.0	-90.0	0	0	0.007	0.003		
					C	100.0	150.0	0	0	0.009	0.005		
Bus163	3-Phase	Load	33.000	1	A	100.0	0.0	0	0	0	0	0.000	0.000
					B	100.0	-120.0	0	0	0	0		
					C	100.0	120.0	0	0	0	0		
Bus165	3-Phase	Load	0.400	1	A	100.0	30.0	0	0	0.012	0.005	0.000	0.000
					B	100.0	-90.0	0	0	0.007	0.003		
					C	100.0	150.0	0	0	0.011	0.004		
Bus166	3-Phase	Load	33.000	1	A	100.0	0.0	0	0	0	0	0.000	0.000
					B	100.0	-120.0	0	0	0	0		
					C	100.0	120.0	0	0	0	0		
Bus167	3-Phase	Load	33.000	1	A	100.0	0.0	0	0	0	0	0.000	0.000
					B	100.0	-120.0	0	0	0	0		
					C	100.0	120.0	0	0	0	0		
Bus168	3-Phase	Load	33.000	1	A	100.0	0.0	0	0	0	0	0.000	0.000
					B	100.0	-120.0	0	0	0	0		
					C	100.0	120.0	0	0	0	0		
Bus170	3-Phase	Load	0.400	1	A	100.0	30.0	0	0	0.004	0.001	0.000	0.000
					B	100.0	-90.0	0	0	0.006	0.002		
					C	100.0	150.0	0	0	0.004	0.002		
Bus171	3-Phase	Load	33.000	1	A	100.0	0.0	0	0	0	0	0.000	0.000
					B	100.0	-120.0	0	0	0	0		
					C	100.0	120.0	0	0	0	0		
Bus172	3-Phase	Load	33.000	1	A	100.0	0.0	0	0	0	0	0.000	0.000
					B	100.0	-120.0	0	0	0	0		
					C	100.0	120.0	0	0	0	0		
Bus173	3-Phase	Load	33.000	1	A	100.0	0.0	0	0	0	0	0.000	0.000
					B	100.0	-120.0	0	0	0	0		
					C	100.0	120.0	0	0	0	0		
Bus175	3-Phase	Load	0.400	1	A	100.0	30.0	0	0	0.020	0.005	0.000	0.000
					B	100.0	-90.0	0	0	0.015	0.007		
					C	100.0	150.0	0	0	0.019	0.006		
Bus176	3-Phase	Load	33.000	1	A	100.0	0.0	0	0	0	0	0.000	0.000
					B	100.0	-120.0	0	0	0	0		
					C	100.0	120.0	0	0	0	0		
Bus178	3-Phase	Load	0.400	1	A	100.0	30.0	0	0	0.014	0.004	0.000	0.000
					B	100.0	-90.0	0	0	0.013	0.004		
					C	100.0	150.0	0	0	0.014	0.005		

Project:  
Location:  
Contract:  
Engineer:  
Filename: unbalance

**ETAP**  
**12.6.0H**

Study Case: ULF

Page: 12  
Date: 05-03-2017  
SN:  
Revision: Base  
Config.: Normal

Bus					Initial Voltage			Generation		Load		Mvar Limits	
ID	Conn.	Type	kV	Sub-sys	Ph	% Mag.	Ang.	MW	Mvar	MW	Mvar	Max.	Min.
Bus179	3-Phase	Load	33.000	1	A	100.0	0.0	0	0	0	0	0.000	0.000
					B	100.0	-120.0	0	0	0	0		
					C	100.0	120.0	0	0	0	0		
Bus180	3-Phase	Load	33.000	1	A	100.0	0.0	0	0	0	0	0.000	0.000
					B	100.0	-120.0	0	0	0	0		
					C	100.0	120.0	0	0	0	0		
Bus181	3-Phase	Load	33.000	1	A	100.0	0.0	0	0	0	0	0.000	0.000
					B	100.0	-120.0	0	0	0	0		
					C	100.0	120.0	0	0	0	0		
Bus183	3-Phase	Load	0.400	1	A	100.0	30.0	0	0	0.012	0.007	0.000	0.000
					B	100.0	-90.0	0	0	0.012	0.007		
					C	100.0	150.0	0	0	0.024	0.005		
Bus184	3-Phase	Load	33.000	1	A	100.0	0.0	0	0	0	0	0.000	0.000
					B	100.0	-120.0	0	0	0	0		
					C	100.0	120.0	0	0	0	0		
Bus185	3-Phase	Load	33.000	1	A	100.0	0.0	0	0	0	0	0.000	0.000
					B	100.0	-120.0	0	0	0	0		
					C	100.0	120.0	0	0	0	0		
Bus188	3-Phase	Load	0.400	1	A	100.0	30.0	0	0	0.006	0.002	0.000	0.000
					B	100.0	-90.0	0	0	0.005	0.002		
					C	100.0	150.0	0	0	0.006	0.002		
Bus189	3-Phase	Load	33.000	1	A	100.0	0.0	0	0	0	0	0.000	0.000
					B	100.0	-120.0	0	0	0	0		
					C	100.0	120.0	0	0	0	0		
Bus191	3-Phase	Load	0.400	1	A	100.0	30.0	0	0	0.005	0.002	0.000	0.000
					B	100.0	-90.0	0	0	0.002	0.001		
					C	100.0	150.0	0	0	0.004	0.002		
Bus192	3-Phase	Load	33.000	1	A	100.0	0.0	0	0	0	0	0.000	0.000
					B	100.0	-120.0	0	0	0	0		
					C	100.0	120.0	0	0	0	0		
Bus193	3-Phase	Load	33.000	1	A	100.0	0.0	0	0	0	0	0.000	0.000
					B	100.0	-120.0	0	0	0	0		
					C	100.0	120.0	0	0	0	0		
Bus194	3-Phase	Load	33.000	1	A	100.0	0.0	0	0	0	0	0.000	0.000
					B	100.0	-120.0	0	0	0	0		
					C	100.0	120.0	0	0	0	0		
Bus195	3-Phase	Load	33.000	1	A	100.0	0.0	0	0	0	0	0.000	0.000
					B	100.0	-120.0	0	0	0	0		
					C	100.0	120.0	0	0	0	0		
Bus196	3-Phase	Load	33.000	1	A	100.0	0.0	0	0	0	0	0.000	0.000
					B	100.0	-120.0	0	0	0	0		
					C	100.0	120.0	0	0	0	0		

Project:  
Location:  
Contract:  
Engineer:  
Filename: unbalance

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

Page: 13  
Date: 05-03-2017  
SN:  
Revision: Base  
Config.: Normal

Bus						Initial Voltage		Generation		Load		Mvar Limits	
ID	Conn.	Type	kV	Sub-sys	Ph	% Mag.	Ang.	MW	Mvar	MW	Mvar	Max.	Min.
Bus197	3-Phase	Load	33.000	1	A	100.0	0.0	0	0	0	0	0.000	0.000
					B	100.0	-120.0	0	0	0	0		
					C	100.0	120.0	0	0	0	0		
Bus198	3-Phase	Load	33.000	1	A	100.0	0.0	0	0	0	0	0.000	0.000
					B	100.0	-120.0	0	0	0	0		
					C	100.0	120.0	0	0	0	0		
Bus200	3-Phase	Load	0.400	1	A	100.0	30.0	0	0	0.041	0.018	0.000	0.000
					B	100.0	-90.0	0	0	0.036	0.014		
					C	100.0	150.0	0	0	0.038	0.018		
Bus201	3-Phase	Load	33.000	1	A	100.0	0.0	0	0	0	0	0.000	0.000
					B	100.0	-120.0	0	0	0	0		
					C	100.0	120.0	0	0	0	0		
Bus203	3-Phase	Load	0.400	1	A	100.0	30.0	0	0	0.004	0.001	0.000	0.000
					B	100.0	-90.0	0	0	0.006	0.002		
					C	100.0	150.0	0	0	0.004	0.002		
Bus204	3-Phase	Load	33.000	1	A	100.0	0.0	0	0	0	0	0.000	0.000
					B	100.0	-120.0	0	0	0	0		
					C	100.0	120.0	0	0	0	0		
Bus205	3-Phase	Load	33.000	1	A	100.0	0.0	0	0	0	0	0.000	0.000
					B	100.0	-120.0	0	0	0	0		
					C	100.0	120.0	0	0	0	0		
Bus206	3-Phase	Load	33.000	1	A	100.0	0.0	0	0	0	0	0.000	0.000
					B	100.0	-120.0	0	0	0	0		
					C	100.0	120.0	0	0	0	0		
Bus208	3-Phase	Load	0.400	1	A	100.0	30.0	0	0	0.024	0.008	0.000	0.000
					B	100.0	-90.0	0	0	0.023	0.007		
					C	100.0	150.0	0	0	0.010	0.003		
Bus209	3-Phase	Load	33.000	1	A	100.0	0.0	0	0	0	0	0.000	0.000
					B	100.0	-120.0	0	0	0	0		
					C	100.0	120.0	0	0	0	0		
Bus211	3-Phase	Load	0.400	1	A	100.0	30.0	0	0	0.029	0.009	0.000	0.000
					B	100.0	-90.0	0	0	0.027	0.008		
					C	100.0	150.0	0	0	0.036	0.011		
Total Number of Buses: 149								2.782	1.195	2.757	1.088		

Project:  
Location:  
Contract:  
Engineer:  
Filename: unbalance

ETAP  
12.6.0H  
  
Study Case: ULF

Page: 14  
Date: 05-03-2017  
SN:  
Revision: Base  
Config.: Normal

**Cable Input Data**

Cable										
ID	Conn.	Library	Size	Length		#/Phase	T (°C)	Ohms/1000 ft per Conductor		
				Adj. (ft)	% Tol.			R	X	Y
C.20	3-Phase			65.6	0.0	1	75	0.097536	0.067056	
C56	3-Phase			183.7	0.0	1	75	0.097536	0.067056	
C59	3-Phase			193.6	0.0	1	75	0.097841	0.067361	
C60	3-Phase			1207.3	0.0	1	75	0.097536	0.067056	
C61	3-Phase			200.1	0.0	1	75	0.097841	0.067361	
C80	3-Phase			262.5	0.0	1	75	0.097536	0.067056	
C96	3-Phase			315.0	0.0	1	75	0.097536	0.067056	
C97	3-Phase			318.2	0.0	1	75	0.097536	0.067056	
C100	3-Phase			328.1	0.0	1	75	0.097536	0.067056	
C107	3-Phase			347.8	0.0	1	75	0.097536	0.067056	
C117	3-Phase			383.9	0.0	1	75	0.097536	0.067056	
C120	3-Phase			393.7	0.0	1	75	0.097536	0.067056	
C128	3-Phase			419.9	0.0	1	75	0.097536	0.067056	
C160	3-Phase			524.9	0.0	1	75	0.097536	0.067056	
C162	3-Phase			531.5	0.0	1	75	0.097536	0.067056	
C163	3-Phase			534.8	0.0	1	75	0.097536	0.067056	
C191	3-Phase			623.4	0.0	1	75	0.097536	0.067056	
C193	3-Phase			633.2	0.0	1	75	0.097536	0.067056	
C203	3-Phase			666.0	0.0	1	75	0.097536	0.067056	
C216	3-Phase			708.7	0.0	1	75	0.097536	0.067056	
C246	3-Phase			807.1	0.0	1	75	0.097536	0.067056	
C280	3-Phase			918.6	0.0	1	75	0.097536	0.067056	
C319	3-Phase			1046.6	0.0	1	75	0.097536	0.067056	
C322	3-Phase			1056.4	0.0	1	75	0.097536	0.067056	
C330	3-Phase			1082.7	0.0	1	75	0.097536	0.067056	
C352	3-Phase			1154.9	0.0	1	75	0.097536	0.067056	
C361	3-Phase			1181.1	0.0	1	75	0.097536	0.067056	
C365	3-Phase			1181.1	0.0	1	75	0.097536	0.067056	
C368	3-Phase			1207.3	0.0	1	75	0.097536	0.067056	
C399	3-Phase			1309.1	0.0	1	75	0.097536	0.067056	
C409	3-Phase			1509.2	0.0	1	75	0.097536	0.067056	
C419	3-Phase			1374.7	0.0	1	75	0.097536	0.067056	
C422	3-Phase			1384.5	0.0	1	75	0.097536	0.067056	
C440	3-Phase			1443.6	0.0	1	75	0.097536	0.067056	

Project:  
Location:  
Contract:  
Engineer:  
Filename: unbalance

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

Page: 15  
Date: 05-03-2017  
SN:  
Revision: Base  
Config.: Normal

Cable										
ID	Conn.	Library	Size	Length		#/Phase	T (°C)	Ohms/1000 ft per Conductor		
				Adj. (ft)	% Tol.			R	X	Y
C450	3-Phase			1476.4	0.0	1	75	0.097536	0.067056	
C.450	3-Phase			1476.4	0.0	1	75	0.097536	0.067056	
C461	3-Phase			1515.7	0.0	1	75	0.097536	0.067056	
C462	3-Phase			1509.2	0.0	1	75	0.097536	0.067056	
C463	3-Phase			1519.0	0.0	1	75	0.097841	0.067056	
C473	3-Phase			1551.8	0.0	1	75	0.097536	0.067056	
C476	3-Phase			1561.7	0.0	1	75	0.097536	0.067056	
C514	3-Phase			1686.4	0.0	1	75	0.097536	0.067056	
C517	3-Phase			1696.2	0.0	1	75	0.097536	0.067056	
C518	3-Phase			1699.5	0.0	1	75	0.097536	0.067056	
C526	3-Phase			1725.7	0.0	1	75	0.097536	0.067056	
C558	3-Phase			1830.7	0.0	1	75	0.097536	0.067056	
C577	3-Phase			1889.8	0.0	1	75	0.097536	0.067056	
C587	3-Phase			1925.9	0.0	1	75	0.097536	0.067056	
C603	3-Phase			1978.3	0.0	1	75	0.097536	0.067056	
C622	3-Phase			2040.7	0.0	1	75	0.097536	0.067056	
C727	3-Phase			2385.2	0.0	1	75	0.097536	0.067056	
C728	3-Phase			2388.5	0.0	1	75	0.097536	0.067056	
C806	3-Phase			2644.4	0.0	1	75	0.097536	0.067056	
C811	3-Phase			2660.8	0.0	1	75	0.097536	0.067056	
C815	3-Phase			2673.9	0.0	1	75	0.097536	0.067056	
C880	3-Phase			2887.1	0.0	1	75	0.097536	0.067056	

Cable resistances are listed at the specified temperatures.

Project:  
Location:  
Contract:  
Engineer:  
Filename: unbalance

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

Page: 16  
Date: 05-03-2017  
SN:  
Revision: Base  
Config.: Normal

**Impedance/Line Input Data**

ID	Type	Connection	Length		Operating Temp °C
			Adj. (ft)	% Tol.	
Co14	Imp	3-Phase			
Co57	Imp	3-Phase			
Co58	Imp	3-Phase			
Co130	Imp	3-Phase			
Co260	Imp	3-Phase			
Co261	Imp	3-Phase			
Co294	Imp	3-Phase			
Co528	Imp	3-Phase			
Co600	Imp	3-Phase			
Co645	Imp	3-Phase			
Co999	Imp	3-Phase			
Co.1032	Imp	3-Phase			
D240	Imp	3-Phase			
D256	Imp	3-Phase			
D276	Imp	3-Phase			
D634	Imp	3-Phase			
D655	Imp	3-Phase			
D711	Imp	3-Phase			
D718	Imp	3-Phase			
R10	Imp	3-Phase			
R36	Imp	3-Phase			
R45	Imp	3-Phase			
R106	Imp	3-Phase			
R150	Imp	3-Phase			
R164	Imp	3-Phase			
R190	Imp	3-Phase			
R380	Imp	3-Phase			
R410	Imp	3-Phase			
R436	Imp	3-Phase			
R455	Imp	3-Phase			
R560	Imp	3-Phase			
R734	Imp	3-Phase			
R803	Imp	3-Phase			
R844	Imp	3-Phase			
R950	Imp	3-Phase			



Project:

ETAP

Page: 17

Location:

12.6.0H

Date: 05-03-2017

Contract:

SN:

Engineer:

Study Case: ULF

Revision: Base

Filename: unbalance

Config.: Normal

---

ID	Type	Connection	Length		Operating Temp °C
			Adj. (ft)	% Tol.	
R1435	Imp	3-Phase			
R1499	Imp	3-Phase			

Line resistances are listed at the specified temperatures.

Project:  
Location:  
Contract:  
Engineer:  
Filename: unbalance

ETAP  
12.6.0H  
  
Study Case: ULF

Page: 18  
Date: 05-03-2017  
SN:  
Revision: Base  
Config.: Normal

**Series Impedance/Shunt Admittance**

**Matrices (Phase Domain)**

Line ID	Line ID	Length miles		R (ohms)			X (ohms)			Y (micro-siemens)		
				A	B	C	A	B	C	A	B	C
Co14	Co14		A	0.13800	0	0	0.20300	0	0	0	0	0
			B	0	0.13800	0	0	0.20300	0	0	0	0
			C	0	0	0.13800	0	0	0.20300	0	0	0
Co57	Co57		A	0.01230	0	0	0.01810	0	0	0	0	0
			B	0	0.01230	0	0	0.01810	0	0	0	0
			C	0	0	0.01230	0	0	0.01810	0	0	0
Co58	Co58		A	0.01230	0	0	0.01810	0	0	0	0	0
			B	0	0.01230	0	0	0.01810	0	0	0	0
			C	0	0	0.01230	0	0	0.01810	0	0	0
Co130	Co130		A	0.02800	0	0	0.04130	0	0	0	0	0
			B	0	0.02800	0	0	0.04130	0	0	0	0
			C	0	0	0.02800	0	0	0.04130	0	0	0
Co260	Co260		A	0.05610	0	0	0.08260	0	0	0	0	0
			B	0	0.05610	0	0	0.08260	0	0	0	0
			C	0	0	0.05610	0	0	0.08260	0	0	0
Co261	Co261		A	0.05600	0	0	0.08200	0	0	0	0	0
			B	0	0.05600	0	0	0.08200	0	0	0	0
			C	0	0	0.05600	0	0	0.08200	0	0	0
Co294	Co294		A	0.05700	0	0	0.08400	0	0	0	0	0
			B	0	0.05700	0	0	0.08400	0	0	0	0
			C	0	0	0.05700	0	0	0.08400	0	0	0
Co528	Co528		A	0.11400	0	0	0.16700	0	0	0	0	0
			B	0	0.11400	0	0	0.16700	0	0	0	0
			C	0	0	0.11400	0	0	0.16700	0	0	0
Co600	Co600		A	0.12900	0	0	0.19080	0	0	0	0	0
			B	0	0.12900	0	0	0.19080	0	0	0	0
			C	0	0	0.12900	0	0	0.19080	0	0	0
Co645	Co645		A	0.13900	0	0	0.20500	0	0	0	0	0
			B	0	0.13900	0	0	0.20500	0	0	0	0
			C	0	0	0.13900	0	0	0.20500	0	0	0

Project:  
Location:  
Contract:  
Engineer:  
Filename: unbalance

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

Page: 19  
Date: 05-03-2017  
SN:  
Revision: Base  
Config.: Normal

Line ID	Line ID	Length miles		R (ohms)			X (ohms)			Y (micro-siemens)		
				A	B	C	A	B	C	A	B	C
Co999	Co999		A	0.21500	0	0	0.31700	0	0	0	0	0
			B	0	0.21500	0	0	0.31700	0	0	0	0
			C	0	0	0.21500	0	0	0.31700	0	0	0
Co999	Co999		A	0.21500	0	0	0.31700	0	0	0	0	0
			B	0	0.21500	0	0	0.31700	0	0	0	0
			C	0	0	0.21500	0	0	0.31700	0	0	0
Co.1032	Co.1032		A	0.22300	0	0	0.32800	0	0	0	0	0
			B	0	0.22300	0	0	0.32800	0	0	0	0
			C	0	0	0.22300	0	0	0.32800	0	0	0
D240	D240		A	0.06470	0	0	0.07820	0	0	0	0	0
			B	0	0.06470	0	0	0.07820	0	0	0	0
			C	0	0	0.06470	0	0	0.07820	0	0	0
D256	D256		A	0.06470	0	0	0.07820	0	0	0	0	0
			B	0	0.06470	0	0	0.07820	0	0	0	0
			C	0	0	0.06470	0	0	0.07820	0	0	0
D276	D276		A	0.18000	0	0	0.21840	0	0	0	0	0
			B	0	0.18000	0	0	0.21840	0	0	0	0
			C	0	0	0.18000	0	0	0.21840	0	0	0
D634	D634		A	0.17100	0	0	0.20670	0	0	0	0	0
			B	0	0.17100	0	0	0.20670	0	0	0	0
			C	0	0	0.17100	0	0	0.20670	0	0	0
D655	D655		A	0.17660	0	0	0.21350	0	0	0	0	0
			B	0	0.17660	0	0	0.21350	0	0	0	0
			C	0	0	0.17660	0	0	0.21350	0	0	0
D711	D711		A	0.19100	0	0	0.23100	0	0	0	0	0
			B	0	0.19100	0	0	0.23100	0	0	0	0
			C	0	0	0.19100	0	0	0.23100	0	0	0
D718	D718		A	0.19300	0	0	0.23400	0	0	0	0	0
			B	0	0.19300	0	0	0.23400	0	0	0	0
			C	0	0	0.19300	0	0	0.23400	0	0	0
R10	R10		A	0.21600	0	0	0.14200	0	0	0	0	0
			B	0	0.21600	0	0	0.14200	0	0	0	0
			C	0	0	0.21600	0	0	0.14200	0	0	0

Project:  
Location:  
Contract:  
Engineer:  
Filename: unbalance

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

Page: 20  
Date: 05-03-2017  
SN:  
Revision: Base  
Config.: Normal

Line ID	Line ID	Length miles		R (ohms)			X (ohms)			Y (micro-siemens)		
				A	B	C	A	B	C	A	B	C
R36	R36		A	0.01900	0	0	0.01200	0	0	0	0	0
			B	0	0.01900	0	0	0.01200	0	0	0	0
			C	0	0	0.01900	0	0	0.01200	0	0	0
R36	R36		A	0.01900	0	0	0.01200	0	0	0	0	0
			B	0	0.01900	0	0	0.01200	0	0	0	0
			C	0	0	0.01900	0	0	0.01200	0	0	0
R45	R45		A	0.02380	0	0	0.01560	0	0	0	0	0
			B	0	0.02380	0	0	0.01560	0	0	0	0
			C	0	0	0.02380	0	0	0.01560	0	0	0
R106	R106		A	0.05600	0	0	0.03600	0	0	0	0	0
			B	0	0.05600	0	0	0.03600	0	0	0	0
			C	0	0	0.05600	0	0	0.03600	0	0	0
R150	R150		A	0.07900	0	0	0.05100	0	0	0	0	0
			B	0	0.07900	0	0	0.05100	0	0	0	0
			C	0	0	0.07900	0	0	0.05100	0	0	0
R164	R164		A	0.07720	0	0	0.05060	0	0	0	0	0
			B	0	0.07720	0	0	0.05060	0	0	0	0
			C	0	0	0.07720	0	0	0.05060	0	0	0
R190	R190		A	0.10051	0	0	0.06500	0	0	0	0	0
			B	0	0.10051	0	0	0.06500	0	0	0	0
			C	0	0	0.10051	0	0	0.06500	0	0	0
R380	R380		A	0.20102	0	0	0.13180	0	0	0	0	0
			B	0	0.20102	0	0	0.13180	0	0	0	0
			C	0	0	0.20102	0	0	0.13180	0	0	0
R410	R410		A	0.21600	0	0	0.14200	0	0	0	0	0
			B	0	0.21600	0	0	0.14200	0	0	0	0
			C	0	0	0.21600	0	0	0.14200	0	0	0
R436	R436		A	0.23000	0	0	0.15100	0	0	0	0	0
			B	0	0.23000	0	0	0.15100	0	0	0	0
			C	0	0	0.23000	0	0	0.15100	0	0	0
R455	R455		A	0.24000	0	0	0.15700	0	0	0	0	0
			B	0	0.24000	0	0	0.15700	0	0	0	0
			C	0	0	0.24000	0	0	0.15700	0	0	0

Project:  
Location:  
Contract:  
Engineer:  
Filename: unbalance

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

Page: 21  
Date: 05-03-2017  
SN:  
Revision: Base  
Config.: Normal

Line ID	Line ID	Length miles	R (ohms)			X (ohms)			Y (micro-siemens)		
			A	B	C	A	B	C	A	B	C
R560	R560		A	0.29600	0	0	0.19400	0	0	0	0
			B	0	0.29600	0	0	0.19400	0	0	0
			C	0	0	0.29600	0	0	0.19400	0	0
R560	R560		A	0.29600	0	0	0.19400	0	0	0	0
			B	0	0.29600	0	0	0.19400	0	0	0
			C	0	0	0.29600	0	0	0.19400	0	0
R734	R734		A	0.38800	0	0	0.25400	0	0	0	0
			B	0	0.38800	0	0	0.25400	0	0	0
			C	0	0	0.38800	0	0	0.25400	0	0
R803	R803		A	0.42400	0	0	0.27800	0	0	0	0
			B	0	0.42400	0	0	0.27800	0	0	0
			C	0	0	0.42400	0	0	0.27800	0	0
R844	R844		A	0.44640	0	0	0.29200	0	0	0	0
			B	0	0.44640	0	0	0.29200	0	0	0
			C	0	0	0.44640	0	0	0.29200	0	0
R950	R950		A	0.50200	0	0	0.32900	0	0	0	0
			B	0	0.50200	0	0	0.32900	0	0	0
			C	0	0	0.50200	0	0	0.32900	0	0
R1435	R1435		A	0.38800	0	0	0.25400	0	0	0	0
			B	0	0.38800	0	0	0.25400	0	0	0
			C	0	0	0.38800	0	0	0.25400	0	0
R1499	R1499		A	0.79200	0	0	0.52000	0	0	0	0
			B	0	0.79200	0	0	0.52000	0	0	0
			C	0	0	0.79200	0	0	0.52000	0	0

For impedances below center-tap transformers, Phases A, B, and C correspond to (1), (2), and (N) respectively.

Project:  
Location:  
Contract:  
Engineer:  
Filename: unbalance

ETAP  
12.6.0H  
  
Study Case: ULF

Page: 22  
Date: 05-03-2017  
SN:  
Revision: Base  
Config.: Normal

## 2-Winding Transformer Input Data

Transformer		Rating								Z Variation		% Tap Setting		Adjusted		Phase Shift	
ID	Phase	MVA	Prim. kV	Sec. kV	% Z1	% Z0	X1/R1	X0/R0	% Tol.	+ 5%	- 5%	Prim.	Sec.	% Z 1	% Z 0	Type	Angle
T1 Al-masjid Al_kaber	3-Phase	0.630	33.000	0.400	4.40	4.40	6.30	6.30	0	0	0	0	0	4.4000	4.4000	Dyn	-30.000
T10 Meqtaa' duma	3-Phase	0.400	33.000	0.400	4.40	4.40	4.00	4.00	0	0	0	0	0	4.4000	4.4000	Dyn	-30.000
T11 Wad ali	3-Phase	0.400	33.000	0.400	4.40	4.40	4.00	4.00	0	0	0	0	0	4.4000	4.4000	Dyn	-30.000
T12 Aqabit gharrarah	3-Phase	0.400	33.000	0.400	4.40	4.40	2.50	2.50	0	0	0	0	0	4.4000	4.4000	Dyn	-30.000
T13 Qata't al_jamal	3-Phase	0.400	33.000	0.400	4.40	4.40	4.00	4.00	0	0	0	0	0	4.4000	4.4000	Dyn	-30.000
T14 Al_markaz	3-Phase	0.400	33.000	0.400	4.40	4.40	4.00	4.00	0	0	0	0	0	4.4000	4.4000	Dyn	-30.000
T15 Abu hashim	3-Phase	0.400	33.000	0.400	4.40	4.40	4.00	4.00	0	0	0	0	0	4.4000	4.4000	Dyn	-30.000
T16 Sa'ada	3-Phase	0.400	33.000	0.400	4.40	4.40	4.00	4.00	0	0	0	0	0	4.4000	4.4000	Dyn	-30.000
T17 Al_baladiya	3-Phase	0.400	33.000	0.400	4.40	4.40	4.00	4.00	0	0	0	0	0	4.4000	4.4000	Dyn	-30.000
T18 Al_sheehk	3-Phase	0.400	33.000	0.400	4.40	4.40	4.00	4.00	0	0	0	0	0	4.4000	4.4000	Dyn	-30.000
T19 Kerbit alama	3-Phase	0.250	33.000	0.400	4.40	4.40	2.50	2.50	0	0	0	0	0	4.4000	4.4000	Dyn	-30.000
T2 Mothalath Al_borg	3-Phase	0.630	33.000	0.400	4.40	4.40	6.30	6.30	0	0	0	0	0	4.4000	4.4000	Dyn	-30.000
T20 Aqabit al_tarsha	3-Phase	0.250	33.000	0.400	4.40	4.40	2.50	2.50	0	0	0	0	0	4.4000	4.4000	Dyn	-30.000
T21 Al_mustashfah	3-Phase	0.250	33.000	0.400	4.40	4.40	2.50	2.50	0	0	0	0	0	4.4000	4.4000	Dyn	-30.000
T22 Da'na	3-Phase	0.250	33.000	0.400	4.40	4.40	2.50	2.50	0	0	0	0	0	4.4000	4.4000	Dyn	-30.000
T23 Kurza	3-Phase	0.250	33.000	0.400	4.40	4.40	2.50	2.50	0	0	0	0	0	4.4000	4.4000	Dyn	-30.000
T24 Al-deire 2	3-Phase	0.250	33.000	0.400	4.40	4.40	2.50	2.50	0	0	0	0	0	4.4000	4.4000	Dyn	-30.000
T25 Rasmi wahab	3-Phase	0.250	33.000	0.400	4.40	4.40	2.50	2.50	0	0	0	0	0	4.4000	4.4000	Dyn	-30.000
T26 Baten alqar'	3-Phase	0.250	33.000	0.400	4.40	4.40	2.50	2.50	0	0	0	0	0	4.4000	4.4000	Dyn	-30.000
T27 Al_muntazah	3-Phase	0.250	33.000	0.400	4.40	4.40	2.50	2.50	0	0	0	0	0	4.4000	4.4000	Dyn	-30.000
T28 Domet al_wridat	3-Phase	0.250	33.000	0.400	4.40	4.40	2.50	2.50	0	0	0	0	0	4.4000	4.4000	Dyn	-30.000
T29 Juret al_dama	3-Phase	0.250	33.000	0.400	4.40	4.40	2.50	2.50	0	0	0	0	0	4.4000	4.4000	Dyn	-30.000
T3 Maskaneh	3-Phase	0.630	33.000	0.400	4.40	4.40	6.30	6.30	0	0	0	0	0	4.4000	4.4000	Dyn	-30.000
T30 Kafar joul	3-Phase	0.250	33.000	0.400	4.40	4.40	2.50	2.50	0	0	0	0	0	4.4000	4.4000	Dyn	-30.000
T31 Sam'a	3-Phase	0.250	33.000	0.400	4.40	4.40	2.50	2.50	0	0	0	0	0	4.4000	4.4000	Dyn	-30.000
T32 Khalet al_ayaseh	3-Phase	0.250	33.000	0.400	4.40	4.40	2.50	2.50	0	0	0	0	0	4.4000	4.4000	Dyn	-30.000
T33 Al_mizrab	3-Phase	0.250	33.000	0.400	4.40	4.40	2.50	2.50	0	0	0	0	0	4.4000	4.4000	Dyn	-30.000
T34 Al_shadaqa	3-Phase	0.250	33.000	0.400	4.40	4.40	2.50	2.50	0	0	0	0	0	4.4000	4.4000	Dyn	-30.000
T35 Al_shuqfan	3-Phase	0.160	33.000	0.400	4.40	4.40	1.60	1.60	0	0	0	0	0	4.4000	4.4000	Dyn	-30.000
T36 Al_estad	3-Phase	0.250	33.000	0.400	4.40	4.40	2.50	2.50	0	0	0	0	0	4.4000	4.4000	Dyn	-30.000
T37 Eshreeteh	3-Phase	0.250	33.000	0.400	4.40	4.40	2.50	2.50	0	0	0	0	0	4.4000	4.4000	Dyn	-30.000
T38 Al_muhtasib	3-Phase	0.250	33.000	0.400	4.40	4.40	2.50	2.50	0	0	0	0	0	4.4000	4.4000	Dyn	-30.000
T39 Jammoq	3-Phase	0.250	33.000	0.400	4.40	4.40	2.50	2.50	0	0	0	0	0	4.4000	4.4000	Dyn	-30.000
T4 Bear mtawi'	3-Phase	0.630	33.000	0.400	4.40	4.40	6.30	6.30	0	0	0	0	0	4.4000	4.4000	Dyn	-30.000
T40 Al_helal	3-Phase	0.250	33.000	0.400	4.40	4.40	2.50	2.50	0	0	0	0	0	4.4000	4.4000	Dyn	-30.000
T41 Al_muntazah 2	3-Phase	0.250	33.000	0.400	4.40	4.40	2.50	2.50	0	0	0	0	0	4.4000	4.4000	Dyn	-30.000
T42 Abu njeem 2	3-Phase	0.250	33.000	0.400	4.40	4.40	2.50	2.50	0	0	0	0	0	4.4000	4.4000	Dyn	-30.000
T43 Al_jame'a	3-Phase	0.250	33.000	0.400	4.40	4.40	2.50	2.50	0	0	0	0	0	4.4000	4.4000	Dyn	-30.000
T44 Alghwla	3-Phase	0.250	33.000	0.400	4.40	4.40	2.50	2.50	0	0	0	0	0	4.4000	4.4000	Dyn	-30.000
T45 Masafi	3-Phase	0.250	33.000	0.400	4.40	4.40	2.50	2.50	0	0	0	0	0	4.4000	4.4000	Dyn	-30.000
T46 Al_jebreni	3-Phase	0.250	33.000	0.400	4.40	4.40	2.50	2.50	0	0	0	0	0	4.4000	4.4000	Dyn	-30.000
T47 Abu_njeem 1	3-Phase	0.160	33.000	0.400	4.40	4.40	1.60	1.60	0	0	0	0	0	4.4000	4.4000	Dyn	-30.000

Project:  
Location:  
Contract:  
Engineer:  
Filename: unbalance

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

Page: 23  
Date: 05-03-2017  
SN:  
Revision: Base  
Config.: Normal

Transformer		Rating								Z Variation		% Tap Setting		Adjusted		Phase Shift	
ID	Phase	MVA	Prim. kV	Sec. kV	% Z1	% Z0	X1/R1	X0/R0	% Tol.	+ 5%	- 5%	Prim.	Sec.	% Z 1	% Z 0	Type	Angle
T48 Inab al_kabeer	3-Phase	0.160	33.000	0.400	4.40	4.40	1.60	1.60	0	0	0	0	0	4.4000	4.4000	Dyn	-30.000
T49 Shweki	3-Phase	0.160	33.000	0.400	4.40	4.40	1.60	1.60	0	0	0	0	0	4.4000	4.4000	Dyn	-30.000
T5 Wad algamary 1	3-Phase	0.400	33.000	0.400	4.40	4.40	4.00	4.00	0	0	0	0	0	4.4000	4.4000	Dyn	-30.000
T50 Al-baha	3-Phase	0.160	33.000	0.400	4.40	4.40	1.60	1.60	0	0	0	0	0	4.4000	4.4000	Dyn	-30.000
T51 Inab al_sagher	3-Phase	0.160	33.000	0.400	4.40	4.40	1.60	1.60	0	0	0	0	0	4.4000	4.4000	Dyn	-30.000
T52 Bank al_eskan	3-Phase	0.160	33.000	0.400	4.40	4.40	1.60	1.60	0	0	0	0	0	4.4000	4.4000	Dyn	-30.000
T53 Al_tork	3-Phase	0.630	33.000	0.400	4.40	4.40	6.30	6.30	0	0	0	0	0	4.4000	4.4000	Dyn	-30.000
T54 Wad algamary 3	3-Phase	0.160	33.000	0.400	4.40	4.40	1.60	1.60	0	0	0	0	0	4.4000	4.4000	Dyn	-30.000
T55 Mana'	3-Phase	0.250	33.000	0.400	4.40	4.40	2.50	2.50	0	0	0	0	0	4.4000	4.4000	Dyn	-30.000
T6 Wad algamary 2	3-Phase	0.250	33.000	0.400	4.40	4.40	2.50	2.50	0	0	0	0	0	4.4000	4.4000	Dyn	-30.000
T7 Al_deir 1	3-Phase	0.400	33.000	0.400	4.40	4.40	4.00	4.00	0	0	0	0	0	4.4000	4.4000	Dyn	-30.000
T8 Karam al_ashqar	3-Phase	0.400	33.000	0.400	4.40	4.40	4.00	4.00	0	0	0	0	0	4.4000	4.4000	Dyn	-30.000
T9 Abu al_humas	3-Phase	0.400	33.000	0.400	4.40	4.40	4.00	4.00	0	0	0	0	0	4.4000	4.4000	Dyn	-30.000

Project:  
Location:  
Contract:  
Engineer:  
Filename: unbalance

ETAP  
12.6.0H  
  
Study Case: ULF

Page: 24  
Date: 05-03-2017  
SN:  
Revision: Base  
Config.: Normal

### Branch Connections

CKT/Branch			Connected Bus ID		% Impedance, Pos. Seq., 100 MVA <sub>b</sub>			
ID	Conn.	Type	From Bus	To Bus	R	X	Z	Y
C.20	3-Phase	Cable	Bus195	Bus196	0.06	0.04	0.07	
C56	3-Phase	Cable	Bus38	Bus42	0.16	0.11	0.20	
C59	3-Phase	Cable	Bus7	Bus9	0.17	0.12	0.21	
C60	3-Phase	Cable	Bus201	Bus204	1.08	0.74	1.31	
C61	3-Phase	Cable	Bus2	Bus3	0.18	0.12	0.22	
C80	3-Phase	Cable	Bus31	Bus32	0.24	0.16	0.29	
C96	3-Phase	Cable	Bus2	Bus21	0.28	0.19	0.34	
C97	3-Phase	Cable	Bus54	Bus57	0.29	0.20	0.35	
C100	3-Phase	Cable	Bus64	Bus69	0.29	0.20	0.36	
C107	3-Phase	Cable	Bus121	Bus124	0.31	0.21	0.38	
C117	3-Phase	Cable	Bus93	Bus96	0.34	0.24	0.42	
C120	3-Phase	Cable	Bus57	Bus63	0.35	0.24	0.43	
C128	3-Phase	Cable	Bus28	Bus31	0.38	0.26	0.46	
C160	3-Phase	Cable	Bus53	Bus54	0.47	0.32	0.57	
C162	3-Phase	Cable	Bus31	Bus38	0.48	0.33	0.58	
C163	3-Phase	Cable	Bus70	Bus83	0.48	0.33	0.58	
C191	3-Phase	Cable	Bus38	Bus53	0.56	0.38	0.68	
C193	3-Phase	Cable	Bus15	Bus17	0.57	0.39	0.69	
C203	3-Phase	Cable	Bus90	Bus113	0.60	0.41	0.72	
C216	3-Phase	Cable	Bus63	Bus64	0.63	0.44	0.77	
C246	3-Phase	Cable	Bus24	Bus28	0.72	0.50	0.88	
C280	3-Phase	Cable	Bus76	Bus79	0.82	0.57	1.00	
C319	3-Phase	Cable	Bus99	Bus102	0.94	0.64	1.14	
C322	3-Phase	Cable	Bus113	Bus114	0.95	0.65	1.15	
C330	3-Phase	Cable	Bus24	Bus26	0.97	0.67	1.18	
C352	3-Phase	Cable	Bus173	Bus176	1.03	0.71	1.26	
C361	3-Phase	Cable	Bus64	Bus70	1.06	0.73	1.28	
C365	3-Phase	Cable	Bus83	Bus87	1.06	0.73	1.28	
C368	3-Phase	Cable	Bus197	Bus198	1.08	0.74	1.31	
C399	3-Phase	Cable	Bus90	Bus93	1.17	0.81	1.42	
C409	3-Phase	Cable	Bus83	Bus86	1.35	0.93	1.64	
C419	3-Phase	Cable	Bus79	Bus82	1.23	0.85	1.49	
C422	3-Phase	Cable	Bus13	Bus15	1.24	0.85	1.50	
C440	3-Phase	Cable	Bus209	Bus201	1.29	0.89	1.57	
C450	3-Phase	Cable	Bus57	Bus60	1.32	0.91	1.60	
C.450	3-Phase	Cable	Bus132	Bus135	1.32	0.91	1.60	
C461	3-Phase	Cable	Bus114	Bus120	1.36	0.93	1.65	



Project:  
Location:  
Contract:  
Engineer:  
Filename: unbalance

ETAP  
12.6.0H

Study Case: ULF

Page: 25  
Date: 05-03-2017  
SN:  
Revision: Base  
Config.: Normal

CKT/Branch			Connected Bus ID		% Impedance, Pos. Seq., 100 MVA <sub>b</sub>			
ID	Conn.	Type	From Bus	To Bus	R	X	Z	Y
C462	3-Phase	Cable	Bus73	Bus76	1.35	0.93	1.64	
C463	3-Phase	Cable	Bus10	Bus11	1.36	0.94	1.65	
C473	3-Phase	Cable	Bus21	Bus24	1.39	0.96	1.69	
C476	3-Phase	Cable	Bus96	Bus103	1.40	0.96	1.70	
C514	3-Phase	Cable	Bus9	Bus10	1.51	1.04	1.83	
C517	3-Phase	Cable	Bus126	Bus127	1.52	1.04	1.84	
C518	3-Phase	Cable	Bus121	Bus126	1.52	1.05	1.85	
C526	3-Phase	Cable	Bus10	Bus13	1.55	1.06	1.88	
C558	3-Phase	Cable	Bus176	Bus179	1.64	1.13	1.99	
C577	3-Phase	Cable	Bus114	Bus121	1.69	1.16	2.05	
C587	3-Phase	Cable	Bus103	Bus106	1.72	1.19	2.09	
C603	3-Phase	Cable	Bus87	Bus90	1.77	1.22	2.15	
C622	3-Phase	Cable	Bus32	Bus35	1.83	1.26	2.22	
C727	3-Phase	Cable	Bus42	Bus43	2.14	1.47	2.59	
C728	3-Phase	Cable	Bus70	Bus73	2.14	1.47	2.60	
C806	3-Phase	Cable	Bus176	Bus180	2.37	1.63	2.87	
C811	3-Phase	Cable	Bus197	Bus209	2.38	1.64	2.89	
C815	3-Phase	Cable	Bus127	Bus132	2.39	1.65	2.91	
C880	3-Phase	Cable	Bus135	Bus138	2.59	1.78	3.14	
T1 Al-masjid Al_kaber	3-Phase	2W XFMR	Bus42	Bus41	109.49	689.78	698.41	
T2 Mothalath Al_borg	3-Phase	2W XFMR	Bus24	Bus25	109.49	689.78	698.41	
T3 Maskaneh	3-Phase	2W XFMR	Bus57	Bus59	109.49	689.78	698.41	
T4 Bear mtawi'	3-Phase	2W XFMR	Bus7	Bus8	109.49	689.78	698.41	
T5 Wad algamary 1	3-Phase	2W XFMR	Bus15	Bus20	266.79	1067.16	1100.00	
T6 Wad algamary 2	3-Phase	2W XFMR	Bus18	Bus19	653.65	1634.12	1760.00	
T7 Al_deir l	3-Phase	2W XFMR	Bus32	Bus34	266.79	1067.16	1100.00	
T8 Karam al_ashqar	3-Phase	2W XFMR	Bus180	Bus208	266.79	1067.16	1100.00	
T9 Abu al_humas	3-Phase	2W XFMR	Bus70	Bus72	266.79	1067.16	1100.00	
T10 Meqtaa' duma	3-Phase	2W XFMR	Bus90	Bus92	266.79	1067.16	1100.00	
T11 Wad ali	3-Phase	2W XFMR	Bus209	Bus211	266.79	1067.16	1100.00	
T12 Aqabit gharrarah	3-Phase	2W XFMR	Bus124	Bus125	408.53	1021.32	1100.00	
T13 Qata't al_jamal	3-Phase	2W XFMR	Bus73	Bus75	266.79	1067.16	1100.00	
T14 Al_markaz	3-Phase	2W XFMR	Bus69	Bus68	266.79	1067.16	1100.00	
T15 Abu hashim	3-Phase	2W XFMR	Bus198	Bus200	266.79	1067.16	1100.00	
T16 Sa'ada	3-Phase	2W XFMR	Bus96	Bus98	266.79	1067.16	1100.00	
T17 Al_baladiya	3-Phase	2W XFMR	Bus28	Bus30	266.79	1067.16	1100.00	
T18 Al_sheehk	3-Phase	2W XFMR	Bus64	Bus66	266.79	1067.16	1100.00	
T19 Kerbit alama	3-Phase	2W XFMR	Bus127	Bus129	653.65	1634.12	1760.00	
T20 Aqabit al_tarsha	3-Phase	2W XFMR	Bus21	Bus22	653.65	1634.12	1760.00	

Project:  
Location:  
Contract:  
Engineer:  
Filename: unbalance

ETAP  
12.6.0H  
Study Case: ULF

Page: 26  
Date: 05-03-2017  
SN:  
Revision: Base  
Config.: Normal

CKT/Branch			Connected Bus ID		% Impedance, Pos. Seq., 100 MVA <sub>b</sub>			
ID	Conn.	Type	From Bus	To Bus	R	X	Z	Y
T21 Al_mustashfah	3-Phase	2W XFMR	Bus103	Bus105	653.65	1634.12	1760.00	
T22 Da'na	3-Phase	2W XFMR	Bus93	Bus95	653.65	1634.12	1760.00	
T23 Kurza	3-Phase	2W XFMR	Bus142	Bus143	653.65	1634.12	1760.00	
T24 Al-deire 2	3-Phase	2W XFMR	Bus35	Bus37	653.65	1634.12	1760.00	
T25 Rasmi wahab	3-Phase	2W XFMR	Bus4	Bus5	653.65	1634.12	1760.00	
T26 Baten alqar'	3-Phase	2W XFMR	Bus146	Bus148	653.65	1634.12	1760.00	
T27 Al_muntazah	3-Phase	2W XFMR	Bus160	Bus162	653.65	1634.12	1760.00	
T28 Domet al_wridat	3-Phase	2W XFMR	Bus106	Bus108	653.65	1634.12	1760.00	
T29 Juret al_dama	3-Phase	2W XFMR	Bus60	Bus62	653.65	1634.12	1760.00	
T30 Kafar joul	3-Phase	2W XFMR	Bus181	Bus183	653.65	1634.12	1760.00	
T31 Sam'a	3-Phase	2W XFMR	Bus201	Bus203	653.65	1634.12	1760.00	
T32 Khalet al_ayaseh	3-Phase	2W XFMR	Bus120	Bus119	653.65	1634.12	1760.00	
T33 Al_mizrab	3-Phase	2W XFMR	Bus155	Bus157	653.65	1634.12	1760.00	
T34 Al_shadaqa	3-Phase	2W XFMR	Bus151	Bus150	653.65	1634.12	1760.00	
T35 Al_shuqfan	3-Phase	2W XFMR	Bus179	Bus178	1457.50	2332.00	2750.00	
T36 Al_estad	3-Phase	2W XFMR	Bus185	Bus188	653.65	1634.12	1760.00	
T37 Eshreeteh	3-Phase	2W XFMR	Bus82	Bus81	653.65	1634.12	1760.00	
T38 Al_muhtasib	3-Phase	2W XFMR	Bus132	Bus133	653.65	1634.12	1760.00	
T39 Jammoq	3-Phase	2W XFMR	Bus86	Bus85	653.65	1634.12	1760.00	
T40 Al_helal	3-Phase	2W XFMR	Bus152	Bus154	653.65	1634.12	1760.00	
T41 Al_muntazah 2	3-Phase	2W XFMR	Bus163	Bus165	653.65	1634.12	1760.00	
T42 Abu njeem 2	3-Phase	2W XFMR	Bus13	Bus14	653.65	1634.12	1760.00	
T43 Al_jame'a	3-Phase	2W XFMR	Bus114	Bus116	653.65	1634.12	1760.00	
T44 Alghwla	3-Phase	2W XFMR	Bus192	Bus191	653.65	1634.12	1760.00	
T45 Masafi	3-Phase	2W XFMR	Bus87	Bus89	653.65	1634.12	1760.00	
T46 Al_jebreni	3-Phase	2W XFMR	Bus138	Bus139	653.65	1634.12	1760.00	
T47 Abu_njeem 1	3-Phase	2W XFMR	Bus11	Bus12	1457.50	2332.00	2750.00	
T48 Inab al_kabeer	3-Phase	2W XFMR	Bus171	Bus170	1457.50	2332.00	2750.00	
T49 Shweki	3-Phase	2W XFMR	Bus51	Bus52	1457.50	2332.00	2750.00	
T50 Al-baha	3-Phase	2W XFMR	Bus44	Bus46	1457.50	2332.00	2750.00	
T51 Inab al_sagher	3-Phase	2W XFMR	Bus173	Bus175	1457.50	2332.00	2750.00	
T52 Bank al_eskan	3-Phase	2W XFMR	Bus54	Bus56	1457.50	2332.00	2750.00	
T53 Al_tork	3-Phase	2W XFMR	Bus102	Bus101	109.49	689.78	698.41	
T54 Wad algamary 3	3-Phase	2W XFMR	Bus26	Bus27	1457.50	2332.00	2750.00	
T55 Mana'	3-Phase	2W XFMR	Bus76	Bus78	653.65	1634.12	1760.00	

Project:  
Location:  
Contract:  
Engineer:  
Filename: unbalance

ETAP  
12.6.0H  
  
Study Case: ULF

Page: 27  
Date: 05-03-2017  
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: 28  
Date: 05-03-2017  
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	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		
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		
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: 29  
Date: 05-03-2017  
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	99.936	-120.0	0	0	0	0	B	0.005	0.003	0.3	89.5	
									C	99.956	120.0	0	0	0	0	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								
								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										
Bus11	33.000	A	99.952	0.0	0	0	0	0	Bus10	A	-0.006	-0.002	0.3	93.7							
									B	99.936	-120.0	0	0	0	0	B	-0.005	-0.003	0.3	89.5	
									C	99.956	120.0	0	0	0	0	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: 30  
Date: 05-03-2017  
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: 31  
Date: 05-03-2017  
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: 32  
Date: 05-03-2017  
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	0.400	A	99.507	29.7	0	0	0.031	0.016	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			
		B	99.658	-90.3	0	0	0.024	0.010	Bus24	A	-0.031	-0.016	149.8	89.0		
										B	-0.024	-0.010	112.8	93.0		
										C	-0.027	-0.012	127.2	91.0		
										N			34.9			
		C	99.613	149.7	0	0	0.027	0.012								
Bus26	33.000	A	99.958	0.0	0	0	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			
		B	99.942	-120.0	0	0	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			
C	99.960	120.0	0	0	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					
Bus27	0.400	A	99.522	29.8	0	0	0.006	0.002	Bus27	A	-0.006	-0.002	26.9	92.8		
										B	-0.005	-0.002	21.3	94.9		
										C	-0.006	-0.002	25.2	95.9		
										N			3.2			
		B	99.625	-90.1	0	0	0.005	0.002	Bus29	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			
C	99.595	149.8	0	0	0.006	0.002	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					
Bus28	33.000	A	99.942	0.0	0	0	0	0	Bus28	A	-0.021	-0.006	95.5	96.5		
										B	-0.019	-0.004	82.9	97.4		
										C	-0.016	-0.005	74.2	95.0		
										N			24.1			
		B	99.926	-120.0	0	0	0	0	Bus31	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			
C	99.944	120.0	0	0	0	0	Bus32	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					



Project:  
Location:  
Contract:  
Engineer:  
Filename: unbalance

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

Page: 33  
Date: 05-03-2017  
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: 34  
Date: 05-03-2017  
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
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: 35  
Date: 05-03-2017  
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			
		B	99.902	-120.0	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			
		C	99.921	120.0	0	0	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			
		N							Bus46	A	0.019	0.005	1.0	96.9		
									B	0.018	0.005	1.0	96.1			
									C	0.018	0.005	1.0	96.6			
									N				0.0			
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					
B	98.747	-90.7	0	0	0.019	0.004	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					
C	98.909	149.4	0	0	0.017	0.003	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					
N							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					
A	99.918	0.0	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				
B	99.901	-120.0	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				
C	99.920	120.0	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				
N								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				
A	99.917	0.0	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				
B	99.900	-120.0	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				
C	99.919	120.0	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				
N								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				
A	99.917	0.0	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				
B	99.900	-120.0	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				
C	99.919	120.0	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				
N								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: 36  
Date: 05-03-2017  
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: 37  
Date: 05-03-2017  
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											
0.400	A	98.891	29.5	0	0	0.022	0.011	Bus57	A	-0.406	-0.171	23.2	92.2									
									B	98.878	-120.0	0	0	0	0	B	-0.413	-0.174	23.5	92.2		
									C	98.897	120.0	0	0	0	0	C	-0.407	-0.178	23.3	91.6		
									N			0.0										
	B	98.891	29.5	0	0	0.022	0.011	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	98.878	-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: 38  
Date: 05-03-2017  
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
Bus66	0.400	A	98.954	29.3	0	0	0.040	0.018	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		
		B	99.112	-90.6	0	0	0.036	0.014	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		
		C	99.005	149.4	0	0	0.038	0.018	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		
	A	98.954	29.3	0	0	0.040	0.018	Bus64	A	-0.040	-0.018	193.0	91.5		
									B	-0.036	-0.014	168.0	93.0		
									C	-0.038	-0.018	181.2	90.6		
									N			29.4			
B	99.112	-90.6	0	0	0.036	0.014	Bus69	A	-0.023	-0.009	106.0	93.6			
								B	-0.026	-0.007	116.4	97.0			
								C	-0.020	-0.005	91.6	96.8			
								N			33.2				
C	99.005	149.4	0	0	0.038	0.018	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				
Bus69	33.000	A	99.885	0.0	0	0	0	0	Bus64	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		
		B	99.868	-120.0	0	0	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		
	C	99.887	120.0	0	0	0	0	Bus83	A	0.263	0.116	15.1	91.4		
									B	0.275	0.116	15.7	92.2		
									C	0.270	0.127	15.7	90.5		
									N			0.0			
A	98.954	29.3	0	0	0.040	0.018	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: 39  
Date: 05-03-2017  
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							
Bus72	0.400	A	99.173	29.3	0	0	0.038	0.011	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									
		B	99.174	-90.7	0	0	0.038	0.011	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									
	C	99.128	149.3	0	0	0.040	0.013	A	-0.038	-0.011	174.1	96.0										
								B	-0.038	-0.011	171.9	95.8										
								C	-0.040	-0.013	185.0	95.5										
								N			13.8											
	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									
B		99.850	-120.0	0	0	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										
C	99.870	120.0	0	0	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											
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										
	B	99.545	-90.3	0	0	0.015	0.006	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										
33.000	A	99.866	0.0	0	0	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										
	B	99.849	-120.0	0	0	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										
C	99.869	120.0	0	0	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:  
Location:  
Contract:  
Engineer:  
Filename: unbalance

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

Page: 40  
Date: 05-03-2017  
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
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: 41  
Date: 05-03-2017  
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: 42  
Date: 05-03-2017  
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							
									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									
									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									
									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									
	Bus92	0.400	A	99.343	29.5	0	0	0.028	0.008	Bus90	A	-0.028	-0.008	126.5	96.5							
			B	99.153	-90.5	0	0	0.031	0.013		B	-0.031	-0.013	146.2	92.6							
			C	99.245	149.5	0	0	0.026	0.012		C	-0.026	-0.012	125.7	91.5							
									N				7.5									
Bus93	33.000	A	99.836	0.0	0	0	0	0	Bus96	A	0.080	0.043	4.8	88.4								
										B	99.817	-120.0	0	0	0	0	B	0.084	0.048	5.1	86.8	
										C	99.836	120.0	0	0	0	0	C	0.077	0.048	4.8	84.8	
																N			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							
		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						
Bus95	0.400	A	99.457	29.8	0	0	0.008	0.004	Bus93	A	-0.008	-0.004	37.8	87.7								
										B	99.419	-90.2	0	0	0.008	0.005	B	-0.008	-0.005	40.8	86.5	
										C	99.451	149.8	0	0	0.007	0.005	C	-0.007	-0.005	36.5	80.0	
																N			3.1			
Bus96	33.000	A	99.835	0.0	0	0	0	0	Bus93	A	-0.080	-0.043	4.8	88.4								
										B	99.816	-120.0	0	0	0	0	B	-0.084	-0.048	5.1	86.8	
										C	99.835	120.0	0	0	0	0	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: 43  
Date: 05-03-2017  
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			
		B	99.520	-90.3	0	0	0.019	0.004	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			
		C	99.527	149.7	0	0	0.016	0.005	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			
	A	99.454	29.6	0	0	0.021	0.006	Bus96	A	-0.021	-0.006	95.6	96.5		
								B	-0.019	-0.004	82.9	97.4			
								C	-0.016	-0.005	74.3	95.0			
								N			24.1				
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				
	B	99.815	-120.0	0	0	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				
C	99.834	120.0	0	0	0	0	Bus102	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					
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				
	B	99.814	-120.0	0	0	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				

Project:  
Location:  
Contract:  
Engineer:  
Filename: unbalance

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

Page: 44  
Date: 05-03-2017  
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
Bus103	33.000	A	99.832	0.0	0	0	0	0	Bus96	A	-0.041	-0.013	2.3	95.4	
		B	99.813	-120.0	0	0	0	0		B	-0.038	-0.018	2.2	91.0	
		C	99.833	120.0	0	0	0	0		C	-0.036	-0.013	2.0	94.1	
										N			0.0		
									Bus106	A	0.024	0.008	1.3	94.3	
										B	0.021	0.008	1.2	92.9	
										C	0.023	0.006	1.2	96.5	
										N			0.0		
									Bus105	A	0.017	0.004	0.9	96.8	
										B	0.017	0.009	1.0	88.3	
										C	0.013	0.007	0.8	89.0	
										N			0.0		
Bus105	0.400	A	98.986	29.5	0	0	0.020	0.008	Bus103	A	-0.020	-0.008	96.3	92.4	
		B	99.234	-90.4	0	0	0.015	0.006		B	-0.015	-0.006	70.5	94.0	
		C	99.377	149.7	0	0	0.011	0.005		C	-0.011	-0.005	53.0	92.5	
										N			40.8		
Bus106	33.000	A	99.831	0.0	0	0	0	0	Bus103	A	-0.024	-0.008	1.3	94.3	
		B	99.812	-120.0	0	0	0	0		B	-0.021	-0.008	1.2	92.9	
		C	99.831	120.0	0	0	0	0		C	-0.023	-0.006	1.2	96.5	
										N			0.0		
									Bus108	A	0.024	0.008	1.3	94.3	
										B	0.021	0.008	1.2	92.9	
										C	0.023	0.006	1.2	96.5	
										N			0.0		
									Bus108	A	-0.022	-0.007	100.6	95.0	
										B	-0.020	-0.008	94.5	93.7	
										C	-0.025	-0.006	114.1	97.0	
										N			19.9		
Bus108	0.400	A	99.015	29.4	0	0	0.022	0.007	Bus106	A	-0.022	-0.007	100.6	95.0	
		B	99.028	-90.5	0	0	0.020	0.008		B	-0.020	-0.008	94.5	93.7	
		C	99.005	149.3	0	0	0.025	0.006		C	-0.025	-0.006	114.1	97.0	
										N			19.9		
									Bus113	A	-0.113	-0.049	6.5	91.8	
										B	-0.118	-0.039	6.6	94.9	
										C	-0.124	-0.049	7.0	93.1	
										N			0.0		
									Bus114	A	0.113	0.049	6.5	91.8	
										B	0.118	0.039	6.6	94.9	
										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: 45  
Date: 05-03-2017  
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
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: 46  
Date: 05-03-2017  
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: 47  
Date: 05-03-2017  
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						
Bus129	0.400	A	99.457	29.7	0	0	0.010	0.003	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									
		B	99.455	-90.3	0	0	0.012	0.002	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									
	C	99.444	149.6	0	0	0.013	0.002	Bus127	A	-0.010	-0.003	46.5	96.6								
								B	-0.012	-0.002	53.9	98.7									
								C	-0.013	-0.002	56.5	98.3									
								N			7.9										
	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			0.0									
B		99.799	-120.0	0	0	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										
C	99.816	120.0	0	0	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											
0.400	A	99.402	29.7	0	0	0.010	0.004	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										
	B	99.357	-90.3	0	0	0.013	0.004	Bus132	A	-0.010	-0.004	45.6	92.1								
								B	-0.013	-0.004	58.2	96.2									
								C	-0.016	-0.005	71.3	95.5									
								N			19.1										
C	99.261	149.6	0	0	0.016	0.005	Bus132	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											
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			0.0										

Project:  
Location:  
Contract:  
Engineer:  
Filename: unbalance

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

Page: 48  
Date: 05-03-2017  
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  
  
Study Case: ULF

Page: 49  
Date: 05-03-2017  
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
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	Bus145	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	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	93.1	
										N			0.0		
		B	99.002	-90.4	0	0	0.020	0.011	Bus151	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	Bus148	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	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		
		C	99.772	149.9	0	0	0.005	0.001	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		

Project:  
Location:  
Contract:  
Engineer:  
Filename: unbalance

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

Page: 50  
Date: 05-03-2017  
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: 51  
Date: 05-03-2017  
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	0.400								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		
		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: 52  
Date: 05-03-2017  
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			
		Bus165	0.400	A	99.444	29.7	0	0	0.012	0.005	Bus163	A	-0.012	-0.005	56.5	93.6	
				B	99.620	-90.2	0	0	0.007	0.003		B	-0.007	-0.003	34.7	92.7	
				C	99.536	149.7	0	0	0.011	0.004		C	-0.011	-0.004	50.8	95.3	
										N				16.8			
	Bus166	33.000	A	99.932	0.0	0	0	0	0	Bus167	A	0.004	0.002	0.2	89.5		
			B	99.916	-120.0	0	0	0	0		B	0.005	0.002	0.3	95.9		
			C	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				
		Bus167	33.000	A	99.932	0.0	0	0	0	0	Bus166	A	-0.004	-0.002	0.2	89.5	
				B	99.916	-120.0	0	0	0	0		B	-0.005	-0.002	0.3	95.9	
				C	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			
Bus168	33.000	A	99.932	0.0	0	0	0	0	Bus167	A	-0.004	-0.002	0.2	89.5			
		B	99.916	-120.0	0	0	0	0		B	-0.005	-0.002	0.3	95.9			
		C	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: 53  
Date: 05-03-2017  
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		

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: 55  
Date: 05-03-2017  
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	99.897	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: 56  
Date: 05-03-2017  
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: 57  
Date: 05-03-2017  
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
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: 58  
Date: 05-03-2017  
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
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: 59  
Date: 05-03-2017  
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		
		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								
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		
		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								
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		
		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								
Bus209	33.000								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		
		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								
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		

\* 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.

Project:  
Location:  
Contract:  
Engineer:  
Filename: unbalance

ETAP  
12.6.0H  
  
Study Case: ULF

Page: 60  
Date: 05-03-2017  
SN:  
Revision: Base  
Config.: Normal

### Bus Loading Summary Report

Bus			Bus Load						
ID	kV	Rated Amp	Phase	MW	Mvar	MVA	% PF	Amp	% Loading
Bus1	33.000		A	0.939	0.390	1.017	92.4	53.4	
			B	0.928	0.413	1.016	91.4	53.3	
			C	0.914	0.392	0.995	91.9	52.2	
Bus2	33.000		A	0.939	0.390	1.017	92.4	53.4	
			B	0.928	0.413	1.016	91.4	53.3	
			C	0.914	0.392	0.995	91.9	52.2	
Bus3	33.000		A	0.295	0.123	0.320	92.3	16.8	
			B	0.288	0.136	0.318	90.4	16.7	
			C	0.280	0.123	0.306	91.5	16.1	
Bus4	33.000		A	0.295	0.123	0.320	92.3	16.8	
			B	0.288	0.136	0.318	90.4	16.7	
			C	0.280	0.123	0.306	91.5	16.1	
Bus5	0.400		A	0.008	0.004	0.009	87.7	37.8	
			B	0.008	0.005	0.009	86.5	40.8	
			C	0.007	0.005	0.008	80.0	36.5	
Bus6	33.000		A	0.288	0.118	0.311	92.5	16.3	
			B	0.280	0.131	0.309	90.5	16.2	
			C	0.273	0.117	0.297	91.8	15.6	
Bus7	33.000		A	0.288	0.118	0.311	92.5	16.3	
			B	0.279	0.131	0.309	90.5	16.2	
			C	0.273	0.117	0.297	91.8	15.6	
Bus8	0.400		A	0.017	0.008	0.019	90.0	84.2	
			B	0.017	0.008	0.019	91.0	82.8	
			C	0.021	0.011	0.024	89.0	102.8	
Bus9	33.000		A	0.269	0.106	0.289	93.0	15.2	
			B	0.262	0.122	0.289	90.7	15.2	
			C	0.252	0.108	0.274	91.9	14.4	
Bus10	33.000		A	0.057	0.025	0.063	91.8	3.3	
			B	0.056	0.028	0.063	89.6	3.3	
			C	0.054	0.025	0.060	90.6	3.1	
Bus11	33.000		A	0.006	0.002	0.006	93.7	0.3	
			B	0.005	0.003	0.006	89.5	0.3	
			C	0.005	0.002	0.005	95.6	0.3	
Bus12	0.400		A	0.006	0.002	0.006	92.8	26.9	
			B	0.005	0.002	0.005	94.9	21.3	
			C	0.006	0.002	0.006	95.9	25.2	
Bus13	33.000		A	0.052	0.023	0.056	91.5	3.0	
			B	0.051	0.025	0.057	89.6	3.0	
			C	0.049	0.024	0.054	90.0	2.9	
Bus14	0.400		A	0.012	0.004	0.013	95.4	54.4	
			B	0.009	0.005	0.011	87.5	46.3	
			C	0.009	0.002	0.010	97.4	42.1	

Project:  
Location:  
Contract:  
Engineer:  
Filename: unbalance

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

Page: 61  
Date: 05-03-2017  
SN:  
Revision: Base  
Config.: Normal

Bus			Bus Load						
ID	kV	Rated Amp	Phase	MW	Mvar	MVA	% PF	Amp	% Loading
Bus15	33.000		A	0.040	0.020	0.045	89.6	2.4	
			B	0.040	0.020	0.045	89.7	2.3	
			C	0.040	0.020	0.045	90.0	2.4	
Bus17	33.000		A	0.008	0.006	0.010	81.6	0.5	
			B	0.007	0.004	0.008	85.6	0.4	
			C	0.009	0.004	0.009	91.4	0.5	
Bus18	33.000		A	0.008	0.006	0.010	81.6	0.5	
			B	0.007	0.004	0.008	85.6	0.4	
			C	0.009	0.004	0.009	91.4	0.5	
Bus19	0.400		A	0.007	0.004	0.008	86.7	34.7	
			B	0.007	0.003	0.007	90.3	32.5	
			C	0.009	0.005	0.010	88.0	45.6	
Bus20	0.400		A	0.034	0.014	0.037	92.5	161.0	
			B	0.032	0.014	0.035	91.8	151.8	
			C	0.030	0.015	0.034	90.0	147.5	
Bus21	33.000		A	0.644	0.267	0.697	92.4	36.6	
			B	0.641	0.277	0.698	91.8	36.6	
			C	0.634	0.269	0.688	92.1	36.1	
Bus22	0.400		A	0.024	0.008	0.025	94.7	109.7	
			B	0.023	0.008	0.025	94.0	108.4	
			C	0.025	0.006	0.026	97.5	112.3	
Bus24	33.000		A	0.619	0.259	0.671	92.3	35.2	
			B	0.616	0.268	0.672	91.7	35.3	
			C	0.610	0.262	0.664	91.9	34.8	
Bus25	0.400		A	0.031	0.016	0.034	89.0	149.8	
			B	0.024	0.010	0.026	93.0	112.8	
			C	0.027	0.012	0.029	91.0	127.2	
Bus26	33.000		A	0.006	0.002	0.006	93.7	0.3	
			B	0.005	0.003	0.006	89.5	0.3	
			C	0.005	0.002	0.005	95.6	0.3	
Bus27	0.400		A	0.006	0.002	0.006	92.8	26.9	
			B	0.005	0.002	0.005	94.9	21.3	
			C	0.006	0.002	0.006	95.9	25.2	
Bus28	33.000		A	0.583	0.243	0.631	92.3	33.2	
			B	0.585	0.250	0.636	92.0	33.4	
			C	0.578	0.249	0.629	91.9	33.0	
Bus30	0.400		A	0.021	0.006	0.022	96.5	95.5	
			B	0.019	0.004	0.019	97.4	82.9	
			C	0.016	0.005	0.017	95.0	74.2	
Bus31	33.000		A	0.564	0.238	0.612	92.1	32.1	
			B	0.566	0.243	0.616	91.9	32.3	
			C	0.560	0.242	0.610	91.8	32.1	
Bus32	33.000		A	0.046	0.018	0.050	92.9	2.6	
			B	0.046	0.017	0.050	93.7	2.6	
			C	0.047	0.018	0.051	93.5	2.7	

Project:  
Location:  
Contract:  
Engineer:  
Filename: unbalance

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

Page: 62  
Date: 05-03-2017  
SN:  
Revision: Base  
Config.: Normal

Bus			Bus Load						
ID	kV	Rated Amp	Phase	MW	Mvar	MVA	% PF	Amp	% Loading
Bus34	0.400		A	0.038	0.011	0.040	96.0	174.0	
			B	0.038	0.011	0.039	95.8	171.8	
			C	0.040	0.013	0.042	95.5	184.9	
Bus35	33.000		A	0.007	0.005	0.009	82.7	0.4	
			B	0.008	0.005	0.009	86.4	0.5	
			C	0.008	0.006	0.010	80.0	0.5	
Bus37	0.400		A	0.008	0.004	0.009	87.7	37.8	
			B	0.008	0.005	0.009	86.5	40.8	
			C	0.007	0.005	0.008	80.0	36.5	
Bus38	33.000		A	0.517	0.219	0.562	92.1	29.5	
			B	0.519	0.226	0.566	91.7	29.7	
			C	0.513	0.224	0.560	91.6	29.4	
Bus41	0.400		A	0.031	0.016	0.034	89.0	149.9	
			B	0.024	0.010	0.026	93.0	112.8	
			C	0.027	0.012	0.029	91.0	127.2	
Bus42	33.000		A	0.053	0.021	0.057	93.1	3.0	
			B	0.050	0.023	0.055	91.0	2.9	
			C	0.050	0.019	0.053	93.2	2.8	
Bus43	33.000		A	0.023	0.007	0.024	95.9	1.2	
			B	0.024	0.007	0.025	96.1	1.3	
			C	0.023	0.008	0.024	94.6	1.3	
Bus44	33.000		A	0.023	0.007	0.024	95.9	1.2	
			B	0.024	0.007	0.025	96.1	1.3	
			C	0.023	0.008	0.024	94.6	1.3	
Bus46	0.400		A	0.018	0.006	0.019	95.4	84.2	
			B	0.019	0.004	0.020	97.6	85.5	
			C	0.017	0.003	0.018	98.1	76.7	
Bus47	33.000		A	0.004	0.002	0.004	89.5	0.2	
			B	0.005	0.002	0.006	95.9	0.3	
			C	0.005	0.003	0.006	85.3	0.3	
Bus51	33.000		A	0.004	0.002	0.004	89.5	0.2	
			B	0.005	0.002	0.006	95.9	0.3	
			C	0.005	0.003	0.006	85.3	0.3	
Bus52	0.400		A	0.004	0.001	0.004	95.8	18.7	
			B	0.006	0.002	0.006	92.3	27.8	
			C	0.004	0.002	0.005	89.0	20.4	
Bus53	33.000		A	0.465	0.199	0.505	92.0	26.5	
			B	0.469	0.203	0.511	91.8	26.9	
			C	0.463	0.205	0.507	91.4	26.6	
Bus54	33.000		A	0.465	0.199	0.505	92.0	26.5	
			B	0.469	0.203	0.511	91.8	26.9	
			C	0.463	0.205	0.506	91.4	26.6	
Bus56	0.400		A	0.006	0.002	0.006	92.8	26.9	
			B	0.005	0.002	0.005	94.9	21.3	
			C	0.006	0.002	0.006	95.9	25.2	

Project:  
Location:  
Contract:  
Engineer:  
Filename: unbalance

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

Page: 63  
Date: 05-03-2017  
SN:  
Revision: Base  
Config.: Normal

Bus			Bus Load						
ID	kV	Rated Amp	Phase	MW	Mvar	MVA	% PF	Amp	% Loading
Bus57	33.000		A	0.459	0.196	0.499	91.9	26.2	
			B	0.464	0.200	0.506	91.8	26.6	
			C	0.458	0.203	0.501	91.4	26.3	
Bus59	0.400		A	0.031	0.016	0.034	89.0	149.9	
			B	0.024	0.010	0.026	93.0	112.9	
			C	0.027	0.012	0.029	91.0	127.2	
Bus60	33.000		A	0.022	0.012	0.025	88.5	1.3	
			B	0.026	0.011	0.028	91.8	1.5	
			C	0.025	0.014	0.028	86.7	1.5	
Bus62	0.400		A	0.022	0.011	0.025	90.0	109.0	
			B	0.027	0.012	0.030	91.0	130.9	
			C	0.022	0.011	0.025	89.0	109.0	
Bus63	33.000		A	0.406	0.171	0.441	92.2	23.2	
			B	0.413	0.174	0.448	92.2	23.5	
			C	0.407	0.178	0.444	91.6	23.3	
Bus64	33.000		A	0.406	0.171	0.441	92.2	23.2	
			B	0.413	0.174	0.448	92.2	23.5	
			C	0.407	0.178	0.444	91.6	23.3	
Bus66	0.400		A	0.040	0.018	0.044	91.5	193.0	
			B	0.036	0.014	0.038	93.0	168.0	
			C	0.038	0.018	0.041	90.6	181.2	
Bus68	0.400		A	0.023	0.009	0.024	93.6	106.0	
			B	0.026	0.007	0.027	97.0	116.4	
			C	0.020	0.005	0.021	96.8	91.6	
Bus69	33.000		A	0.023	0.007	0.024	95.5	1.3	
			B	0.024	0.007	0.025	95.5	1.3	
			C	0.023	0.008	0.024	94.0	1.3	
Bus70	33.000		A	0.344	0.145	0.374	92.1	19.6	
			B	0.352	0.148	0.381	92.2	20.0	
			C	0.346	0.153	0.378	91.5	19.9	
Bus72	0.400		A	0.038	0.011	0.040	96.0	174.1	
			B	0.038	0.011	0.039	95.8	171.9	
			C	0.040	0.013	0.042	95.5	185.0	
Bus73	33.000		A	0.042	0.015	0.045	94.0	2.4	
			B	0.038	0.020	0.043	88.9	2.2	
			C	0.036	0.014	0.039	93.6	2.0	
Bus75	0.400		A	0.020	0.008	0.022	92.4	96.0	
			B	0.015	0.006	0.016	94.0	70.3	
			C	0.011	0.005	0.012	92.5	52.9	
Bus76	33.000		A	0.025	0.011	0.027	92.0	1.4	
			B	0.021	0.010	0.023	89.6	1.2	
			C	0.023	0.007	0.024	96.0	1.3	
Bus78	0.400		A	0.006	0.005	0.008	80.0	34.3	
			B	0.004	0.003	0.005	78.8	23.9	
			C	0.005	0.004	0.007	79.3	29.1	

Project:  
Location:  
Contract:  
Engineer:  
Filename: unbalance

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

Page: 64  
Date: 05-03-2017  
SN:  
Revision: Base  
Config.: Normal

Bus			Bus Load						
ID	kV	Rated Amp	Phase	MW	Mvar	MVA	% PF	Amp	% Loading
Bus79	33.000		A	0.019	0.006	0.020	95.2	1.0	
			B	0.016	0.005	0.017	94.8	0.9	
			C	0.018	0.003	0.018	98.7	1.0	
Bus81	0.400		A	0.018	0.005	0.019	97.0	82.2	
			B	0.014	0.002	0.014	98.5	62.6	
			C	0.020	0.006	0.021	96.3	90.1	
Bus82	33.000		A	0.019	0.006	0.020	95.2	1.0	
			B	0.016	0.005	0.017	94.8	0.9	
			C	0.018	0.003	0.018	98.7	1.0	
Bus83	33.000		A	0.263	0.116	0.287	91.4	15.1	
			B	0.275	0.116	0.299	92.2	15.7	
			C	0.270	0.127	0.298	90.5	15.7	
Bus85	0.400		A	0.018	0.006	0.019	95.4	84.0	
			B	0.019	0.004	0.020	97.4	85.3	
			C	0.017	0.003	0.018	98.1	76.5	
Bus86	33.000		A	0.019	0.005	0.019	96.8	1.0	
			B	0.018	0.005	0.019	95.9	1.0	
			C	0.018	0.005	0.019	96.3	1.0	
Bus87	33.000		A	0.244	0.112	0.268	91.0	14.1	
			B	0.257	0.110	0.279	91.9	14.7	
			C	0.252	0.122	0.280	90.0	14.7	
Bus89	0.400		A	0.019	0.007	0.020	94.5	87.5	
			B	0.013	0.004	0.013	95.3	58.2	
			C	0.015	0.006	0.016	93.4	67.8	
Bus90	33.000		A	0.227	0.106	0.250	90.6	13.2	
			B	0.241	0.102	0.262	92.1	13.8	
			C	0.237	0.117	0.265	89.7	13.9	
Bus92	0.400		A	0.028	0.008	0.029	96.5	126.5	
			B	0.031	0.013	0.033	92.6	146.2	
			C	0.026	0.012	0.029	91.5	125.7	
Bus93	33.000		A	0.087	0.047	0.099	87.9	5.2	
			B	0.092	0.053	0.106	86.7	5.6	
			C	0.085	0.054	0.101	84.3	5.3	
Bus95	0.400		A	0.008	0.004	0.009	87.7	37.8	
			B	0.008	0.005	0.009	86.5	40.8	
			C	0.007	0.005	0.008	80.0	36.5	
Bus96	33.000		A	0.080	0.043	0.091	88.4	4.8	
			B	0.084	0.048	0.097	86.8	5.1	
			C	0.077	0.048	0.091	84.8	4.8	
Bus98	0.400		A	0.021	0.006	0.022	96.5	95.6	
			B	0.019	0.004	0.019	97.4	82.9	
			C	0.016	0.005	0.017	95.0	74.3	
Bus99	33.000		A	0.020	0.025	0.032	63.1	1.7	
			B	0.026	0.024	0.035	73.3	1.8	
			C	0.024	0.029	0.038	62.9	2.0	



Project:  
Location:  
Contract:  
Engineer:  
Filename: unbalance

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

Page: 65  
Date: 05-03-2017  
SN:  
Revision: Base  
Config.: Normal

Bus			Bus Load						
ID	kV	Rated Amp	Phase	MW	Mvar	MVA	% PF	Amp	% Loading
Bus101	0.400		A	0.022	0.022	0.031	71.6	134.8	
			B	0.026	0.026	0.037	70.8	161.5	
			C	0.020	0.026	0.033	60.9	145.8	
Bus102	33.000		A	0.020	0.025	0.032	63.1	1.7	
			B	0.026	0.024	0.035	73.3	1.8	
			C	0.024	0.029	0.038	62.9	2.0	
Bus103	33.000		A	0.041	0.013	0.043	95.4	2.3	
			B	0.038	0.018	0.042	91.0	2.2	
			C	0.036	0.013	0.038	94.1	2.0	
Bus105	0.400		A	0.020	0.008	0.022	92.4	96.3	
			B	0.015	0.006	0.016	94.0	70.5	
			C	0.011	0.005	0.012	92.5	53.0	
Bus106	33.000		A	0.024	0.008	0.025	94.3	1.3	
			B	0.021	0.008	0.023	92.9	1.2	
			C	0.023	0.006	0.024	96.5	1.2	
Bus108	0.400		A	0.022	0.007	0.023	95.0	100.6	
			B	0.020	0.008	0.022	93.7	94.5	
			C	0.025	0.006	0.026	97.0	114.1	
Bus113	33.000		A	0.113	0.049	0.123	91.8	6.5	
			B	0.118	0.039	0.125	94.9	6.6	
			C	0.124	0.049	0.133	93.1	7.0	
Bus114	33.000		A	0.113	0.049	0.123	91.8	6.5	
			B	0.118	0.039	0.125	94.9	6.6	
			C	0.124	0.049	0.133	93.1	7.0	
Bus116	0.400		A	0.006	0.003	0.007	92.8	30.4	
			B	0.012	0.005	0.013	93.3	55.6	
			C	0.014	0.006	0.015	92.7	64.8	
Bus119	0.400		A	0.007	0.002	0.007	95.3	32.1	
			B	0.011	0.002	0.011	98.0	49.5	
			C	0.006	0.003	0.007	89.0	29.5	
Bus120	33.000		A	0.006	0.003	0.007	91.6	0.4	
			B	0.009	0.002	0.009	98.7	0.5	
			C	0.009	0.005	0.010	88.9	0.5	
Bus121	33.000		A	0.097	0.039	0.105	92.7	5.5	
			B	0.099	0.035	0.105	94.2	5.5	
			C	0.102	0.039	0.109	93.4	5.7	
Bus124	33.000		A	0.027	0.009	0.028	95.4	1.5	
			B	0.030	0.010	0.032	95.1	1.7	
			C	0.028	0.012	0.030	91.6	1.6	
Bus125	0.400		A	0.029	0.007	0.030	97.2	129.2	
			B	0.029	0.011	0.031	93.3	135.8	
			C	0.027	0.010	0.028	94.0	123.1	
Bus126	33.000		A	0.070	0.031	0.077	91.6	4.0	
			B	0.069	0.025	0.073	93.8	3.9	
			C	0.074	0.027	0.079	94.0	4.1	

Project:  
Location:  
Contract:  
Engineer:  
Filename: unbalance

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

Page: 66  
Date: 05-03-2017  
SN:  
Revision: Base  
Config.: Normal

Bus			Bus Load						
ID	kV	Rated Amp	Phase	MW	Mvar	MVA	% PF	Amp	% Loading
Bus127	33.000		A	0.045	0.023	0.050	89.2	2.6	
			B	0.045	0.016	0.048	93.9	2.5	
			C	0.050	0.020	0.054	93.3	2.8	
Bus129	0.400		A	0.010	0.003	0.011	96.6	46.5	
			B	0.012	0.002	0.012	98.7	53.9	
			C	0.013	0.002	0.013	98.3	56.5	
Bus132	33.000		A	0.033	0.019	0.038	86.7	2.0	
			B	0.034	0.014	0.036	92.2	1.9	
			C	0.038	0.017	0.041	91.2	2.2	
Bus133	0.400		A	0.010	0.004	0.010	92.1	45.6	
			B	0.013	0.004	0.013	96.2	58.2	
			C	0.016	0.005	0.016	95.5	71.3	
Bus134	33.000		A	0	0	0	0	0	
			B	0	0	0	0	0	
			C	0	0	0	0	0	
Bus135	33.000		A	0.021	0.012	0.024	85.7	1.3	
			B	0.022	0.011	0.025	90.3	1.3	
			C	0.023	0.013	0.026	87.0	1.4	
Bus138	33.000		A	0.021	0.012	0.024	85.7	1.3	
			B	0.022	0.011	0.025	90.3	1.3	
			C	0.023	0.013	0.026	87.0	1.4	
Bus139	0.400		A	0.019	0.010	0.022	88.0	95.9	
			B	0.024	0.012	0.027	89.0	117.8	
			C	0.022	0.011	0.025	89.0	109.0	
Bus142	33.000		A	0.025	0.008	0.027	95.4	1.4	
			B	0.024	0.009	0.026	93.4	1.3	
			C	0.024	0.007	0.025	95.5	1.3	
Bus143	0.400		A	0.024	0.008	0.025	94.7	109.8	
			B	0.023	0.008	0.025	94.0	108.5	
			C	0.025	0.006	0.026	97.5	112.4	
Bus145	33.000		A	0.211	0.081	0.227	93.3	11.9	
			B	0.206	0.094	0.226	91.0	11.9	
			C	0.198	0.083	0.215	92.3	11.3	
Bus146	33.000		A	0.211	0.081	0.227	93.3	11.9	
			B	0.206	0.094	0.226	91.0	11.9	
			C	0.198	0.083	0.215	92.3	11.3	
Bus148	0.400		A	0.019	0.009	0.021	90.6	91.4	
			B	0.020	0.011	0.022	88.1	98.1	
			C	0.018	0.010	0.021	86.2	90.4	
Bus150	0.400		A	0.006	0.002	0.006	95.0	26.7	
			B	0.005	0.002	0.005	91.1	23.7	
			C	0.005	0.001	0.005	96.8	23.0	
Bus151	33.000		A	0.006	0.002	0.006	95.3	0.3	
			B	0.006	0.003	0.006	89.8	0.3	
			C	0.005	0.002	0.005	91.5	0.3	

Project:  
Location:  
Contract:  
Engineer:  
Filename: unbalance

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

Page: 67  
Date: 05-03-2017  
SN:  
Revision: Base  
Config.: Normal

Bus			Bus Load						
ID	kV	Rated Amp	Phase	MW	Mvar	MVA	% PF	Amp	% Loading
Bus152	33.000		A	0.032	0.014	0.035	91.3	1.9	
			B	0.029	0.016	0.033	88.2	1.7	
			C	0.030	0.012	0.032	92.2	1.7	
Bus154	0.400		A	0.003	0.001	0.003	91.6	11.9	
			B	0.002	0.001	0.002	89.6	8.1	
			C	0.002	0	0.002	99.5	10.1	
Bus155	33.000		A	0.030	0.013	0.032	91.1	1.7	
			B	0.027	0.014	0.031	88.9	1.6	
			C	0.028	0.012	0.030	92.2	1.6	
Bus157	0.400		A	0.006	0.002	0.006	95.0	26.7	
			B	0.005	0.002	0.005	91.1	23.7	
			C	0.005	0.001	0.005	96.8	23.0	
Bus158	33.000		A	0.024	0.012	0.026	89.9	1.4	
			B	0.022	0.011	0.024	88.6	1.3	
			C	0.023	0.010	0.025	92.3	1.3	
Bus159	33.000		A	0.024	0.012	0.026	89.9	1.4	
			B	0.022	0.011	0.024	88.6	1.3	
			C	0.023	0.010	0.025	92.3	1.3	
Bus160	33.000		A	0.024	0.012	0.026	90.0	1.4	
			B	0.022	0.011	0.024	88.6	1.3	
			C	0.023	0.010	0.025	92.3	1.3	
Bus162	0.400		A	0.007	0.004	0.008	86.7	34.7	
			B	0.007	0.003	0.007	90.3	32.5	
			C	0.009	0.005	0.010	88.0	43.4	
Bus163	33.000		A	0.016	0.006	0.017	93.2	0.9	
			B	0.015	0.007	0.017	90.0	0.9	
			C	0.015	0.006	0.016	93.1	0.8	
Bus165	0.400		A	0.012	0.005	0.013	93.6	56.5	
			B	0.007	0.003	0.008	92.7	34.7	
			C	0.011	0.004	0.012	95.3	50.8	
Bus166	33.000		A	0.004	0.002	0.004	89.5	0.2	
			B	0.005	0.002	0.006	95.9	0.3	
			C	0.005	0.003	0.006	85.3	0.3	
Bus167	33.000		A	0.004	0.002	0.004	89.5	0.2	
			B	0.005	0.002	0.006	95.9	0.3	
			C	0.005	0.003	0.006	85.3	0.3	
Bus168	33.000		A	0.004	0.002	0.004	89.5	0.2	
			B	0.005	0.002	0.006	95.9	0.3	
			C	0.005	0.003	0.006	85.3	0.3	
Bus170	0.400		A	0.004	0.001	0.004	95.8	18.7	
			B	0.006	0.002	0.006	92.3	27.8	
			C	0.004	0.002	0.005	89.0	20.4	
Bus171	33.000		A	0.004	0.002	0.004	89.5	0.2	
			B	0.005	0.002	0.006	95.9	0.3	
			C	0.005	0.003	0.006	85.3	0.3	

Project:  
Location:  
Contract:  
Engineer:  
Filename: unbalance

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

Page: 68  
Date: 05-03-2017  
SN:  
Revision: Base  
Config.: Normal

Bus			Bus Load						
ID	kV	Rated Amp	Phase	MW	Mvar	MVA	% PF	Amp	% Loading
Bus172	33.000		A	0.155	0.055	0.165	94.2	8.7	
			B	0.151	0.065	0.164	91.8	8.6	
			C	0.144	0.056	0.155	93.1	8.1	
Bus173	33.000		A	0.155	0.055	0.165	94.2	8.7	
			B	0.151	0.065	0.164	91.8	8.6	
			C	0.144	0.056	0.155	93.2	8.1	
Bus175	0.400		A	0.020	0.005	0.020	96.6	88.6	
			B	0.015	0.007	0.017	92.1	73.3	
			C	0.019	0.006	0.019	95.5	85.1	
Bus176	33.000		A	0.136	0.050	0.145	94.0	7.6	
			B	0.133	0.058	0.145	91.7	7.6	
			C	0.127	0.051	0.137	92.9	7.2	
Bus178	0.400		A	0.014	0.004	0.014	95.2	62.3	
			B	0.013	0.005	0.014	94.4	62.0	
			C	0.013	0.004	0.014	94.9	60.8	
Bus179	33.000		A	0.014	0.005	0.014	94.5	0.8	
			B	0.014	0.005	0.015	94.0	0.8	
			C	0.013	0.005	0.014	93.7	0.7	
Bus180	33.000		A	0.123	0.045	0.130	93.9	6.9	
			B	0.119	0.053	0.130	91.5	6.8	
			C	0.114	0.046	0.123	92.8	6.5	
Bus181	33.000		A	0.030	0.010	0.032	95.2	1.7	
			B	0.024	0.016	0.028	83.8	1.5	
			C	0.022	0.007	0.023	94.9	1.2	
Bus183	0.400		A	0.018	0.009	0.020	89.9	89.0	
			B	0.012	0.007	0.014	86.7	60.7	
			C	0.017	0.002	0.017	98.9	74.8	
Bus184	33.000		A	0.010	0.004	0.011	93.9	0.6	
			B	0.009	0.005	0.011	86.7	0.6	
			C	0.008	0.003	0.009	92.5	0.5	
Bus185	33.000		A	0.010	0.004	0.011	93.9	0.6	
			B	0.009	0.005	0.011	86.7	0.6	
			C	0.008	0.003	0.009	92.5	0.5	
Bus188	0.400		A	0.006	0.002	0.006	95.0	26.7	
			B	0.005	0.002	0.005	91.1	23.7	
			C	0.005	0.001	0.005	96.8	23.0	
Bus189	33.000		A	0.005	0.002	0.005	92.0	0.3	
			B	0.004	0.002	0.004	81.5	0.2	
			C	0.004	0.001	0.004	93.8	0.2	
Bus191	0.400		A	0.005	0.002	0.005	94.7	22.6	
			B	0.002	0.001	0.002	91.9	10.8	
			C	0.004	0.002	0.004	91.0	19.5	
Bus192	33.000		A	0.005	0.002	0.005	92.0	0.3	
			B	0.004	0.002	0.004	81.5	0.2	
			C	0.004	0.001	0.004	93.8	0.2	

Project:  
Location:  
Contract:  
Engineer:  
Filename: unbalance

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

Page: 69  
Date: 05-03-2017  
SN:  
Revision: Base  
Config.: Normal

Bus			Bus Load						
ID	kV	Rated Amp	Phase	MW	Mvar	MVA	% PF	Amp	% Loading
Bus193	33.000		A	0	0	0	0	0	
			B	0	0	0	0	0	
			C	0	0	0	0	0	
Bus194	33.000		A	0.077	0.030	0.083	93.1	4.4	
			B	0.072	0.033	0.079	91.1	4.2	
			C	0.073	0.027	0.078	93.7	4.1	
Bus195	33.000		A	0.077	0.030	0.083	93.1	4.4	
			B	0.072	0.033	0.079	91.1	4.2	
			C	0.073	0.027	0.078	93.7	4.1	
Bus196	33.000		A	0.077	0.030	0.083	93.1	4.4	
			B	0.072	0.033	0.079	91.1	4.2	
			C	0.073	0.027	0.078	93.7	4.1	
Bus197	33.000		A	0.077	0.030	0.083	93.1	4.4	
			B	0.072	0.033	0.079	91.1	4.2	
			C	0.073	0.027	0.078	93.7	4.1	
Bus198	33.000		A	0.039	0.017	0.043	91.8	2.2	
			B	0.038	0.019	0.043	89.8	2.3	
			C	0.037	0.017	0.041	90.6	2.1	
Bus200	0.400		A	0.039	0.017	0.043	91.8	185.9	
			B	0.037	0.017	0.041	90.6	178.6	
			C	0.038	0.015	0.041	92.6	177.7	
Bus201	33.000		A	0.004	0.003	0.005	81.7	0.3	
			B	0.005	0.002	0.005	95.1	0.3	
			C	0.006	0.003	0.006	90.9	0.3	
Bus203	0.400		A	0.004	0.002	0.004	91.6	18.4	
			B	0.005	0.001	0.006	97.1	24.0	
			C	0.005	0.003	0.006	87.0	24.7	
Bus204	33.000		A	0	0	0	0	0	
			B	0	0	0	0	0	
			C	0	0	0	0	0	
Bus205	33.000		A	0	0	0	0	0	
			B	0	0	0	0	0	
			C	0	0	0	0	0	
Bus206	33.000		A	0	0	0	0	0	
			B	0	0	0	0	0	
			C	0	0	0	0	0	
Bus208	0.400		A	0.019	0.002	0.019	99.6	81.0	
			B	0.023	0.008	0.024	94.4	105.2	
			C	0.015	0.009	0.017	87.1	75.4	
Bus209	33.000		A	0.038	0.013	0.041	94.3	2.1	
			B	0.034	0.014	0.037	92.5	1.9	
			C	0.036	0.010	0.037	96.4	2.0	

Project:

Location:

Contract:

Engineer:

Filename: unbalance

ETAP  
12.6.0H

Study Case: ULF

Page: 70

Date: 05-03-2017

SN:

Revision: Base

Config.: Normal

Bus			Bus Load						
ID	kV	Rated Amp	Phase	MW	Mvar	MVA	% PF	Amp	% Loading
Bus211	0.400		A	0.032	0.012	0.034	93.8	148.7	
			B	0.028	0.009	0.029	95.6	127.5	
			C	0.033	0.007	0.034	98.0	146.0	

\* Indicates operating load of a bus exceeds the bus critical limit ( 100.00 % times the continuous rating).

Project:  
Location:  
Contract:  
Engineer:  
Filename: unbalance

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

Page: 71  
Date: 05-03-2017  
SN:  
Revision: Base  
Config.: Normal

**Branch Loading Summary Report**

CKT / Branch				Cable & Reactor			Transformer				
							Capability (MVA)	Loading (input)		Loading (output)	
ID	Conn.	Type	Phase	Ampacity (Amp)	Loading Amp	%		MVA	%	MVA	%
C.20	3-Phase	Cable	A		4.37						
			B		4.17						
			C		4.08						
C56	3-Phase	Cable	A		2.97						
			B		2.87						
			C		2.79						
C59	3-Phase	Cable	A		15.19						
			B		15.17						
			C		14.41						
C60	3-Phase	Cable	A		0.00						
			B		0.00						
			C		0.00						
C61	3-Phase	Cable	A		16.77						
			B		16.70						
			C		16.07						
C80	3-Phase	Cable	A		2.62						
			B		2.60						
			C		2.66						
C96	3-Phase	Cable	A		36.61						
			B		36.64						
			C		36.14						
C97	3-Phase	Cable	A		26.22						
			B		26.57						
			C		26.32						
C100	3-Phase	Cable	A		1.25						
			B		1.32						
			C		1.29						
C107	3-Phase	Cable	A		1.50						
			B		1.68						
			C		1.58						
C117	3-Phase	Cable	A		4.78						
			B		5.08						
			C		4.79						
C120	3-Phase	Cable	A		23.16						
			B		23.54						
			C		23.33						
C128	3-Phase	Cable	A		32.13						
			B		32.34						
			C		32.06						
C160	3-Phase	Cable	A		26.55						

Project:  
Location:  
Contract:  
Engineer:  
Filename: unbalance

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

Page: 72  
Date: 05-03-2017  
SN:  
Revision: Base  
Config.: Normal

CKT / Branch				Cable & Reactor			Transformer				
ID	Conn.	Type	Phase	Ampacity (Amp)	Loading Amp	%	Capability (MVA)	Loading (input)		Loading (output)	
								MVA	%	MVA	%
C162	3-Phase	Cable	B		26.87						
			C		26.61						
			A		29.52						
C163	3-Phase	Cable	B		29.74						
			C		29.40						
			A		15.10						
C191	3-Phase	Cable	B		15.69						
			C		15.67						
			A		26.55						
C193	3-Phase	Cable	B		26.87						
			C		26.61						
			A		0.51						
C203	3-Phase	Cable	B		0.41						
			C		0.50						
			A		6.48						
C216	3-Phase	Cable	B		6.55						
			C		7.00						
			A		23.16						
C246	3-Phase	Cable	B		23.54						
			C		23.33						
			A		33.16						
C280	3-Phase	Cable	B		33.43						
			C		33.05						
			A		1.05						
C319	3-Phase	Cable	B		0.87						
			C		0.96						
			A		1.68						
C322	3-Phase	Cable	B		1.85						
			C		1.98						
			A		6.48						
C330	3-Phase	Cable	B		6.55						
			C		7.00						
			A		0.33						
C352	3-Phase	Cable	B		0.30						
			C		0.29						
			A		7.61						
C361	3-Phase	Cable	B		7.60						
			C		7.20						
			A		19.64						
C365	3-Phase	Cable	B		20.04						
			C		19.88						
			A		14.10						



Project:  
Location:  
Contract:  
Engineer:  
Filename: unbalance

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

Page: 73  
Date: 05-03-2017  
SN:  
Revision: Base  
Config.: Normal

CKT / Branch				Cable & Reactor			Transformer				
ID	Conn.	Type	Phase	Ampacity (Amp)	Loading Amp	%	Capability (MVA)	Loading (input)		Loading (output)	
								MVA	%	MVA	%
C368	3-Phase	Cable	B		14.69						
			C		14.70						
			A		2.24						
C399	3-Phase	Cable	B		2.25						
			C		2.15						
			A		5.22						
C409	3-Phase	Cable	B		5.58						
			C		5.29						
			A		1.01						
C419	3-Phase	Cable	B		1.01						
			C		0.98						
			A		1.05						
C422	3-Phase	Cable	B		0.87						
			C		0.96						
			A		2.36						
C440	3-Phase	Cable	B		2.34						
			C		2.35						
			A		0.27						
C450	3-Phase	Cable	B		0.26						
			C		0.33						
			A		1.33						
C.450	3-Phase	Cable	B		1.46						
			C		1.49						
			A		1.27						
C461	3-Phase	Cable	B		1.30						
			C		1.39						
			A		0.37						
C462	3-Phase	Cable	B		0.49						
			C		0.53						
			A		1.43						
C463	3-Phase	Cable	B		1.22						
			C		1.27						
			A		0.33						
C473	3-Phase	Cable	B		0.30						
			C		0.29						
			A		35.22						
C476	3-Phase	Cable	B		35.30						
			C		34.84						
			A		2.27						
C514	3-Phase	Cable	B		2.22						
			C		2.00						
			A		3.29						

Project:  
Location:  
Contract:  
Engineer:  
Filename: unbalance

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

Page: 74  
Date: 05-03-2017  
SN:  
Revision: Base  
Config.: Normal

CKT / Branch				Cable & Reactor			Transformer				
ID	Conn.	Type	Phase	Ampacity (Amp)	Loading Amp	%	Capability (MVA)	Loading (input)		Loading (output)	
								MVA	%	MVA	%
C517	3-Phase	Cable	B		3.29						
			C		3.14						
			A		2.65						
C518	3-Phase	Cable	B		2.51						
			C		2.85						
			A		4.03						
C526	3-Phase	Cable	B		3.85						
			C		4.14						
			A		2.96						
C558	3-Phase	Cable	B		3.00						
			C		2.86						
			A		0.75						
C577	3-Phase	Cable	B		0.77						
			C		0.75						
			A		5.52						
C587	3-Phase	Cable	B		5.53						
			C		5.72						
			A		1.34						
C603	3-Phase	Cable	B		1.21						
			C		1.24						
			A		13.17						
C622	3-Phase	Cable	B		13.79						
			C		13.92						
			A		0.45						
C727	3-Phase	Cable	B		0.49						
			C		0.50						
			A		1.24						
C728	3-Phase	Cable	B		1.31						
			C		1.28						
			A		2.36						
C806	3-Phase	Cable	B		2.24						
			C		2.04						
			A		6.85						
C811	3-Phase	Cable	B		6.83						
			C		6.45						
			A		2.14						
C815	3-Phase	Cable	B		1.92						
			C		1.95						
			A		2.01						
C880	3-Phase	Cable	B		1.92						
			C		2.18						
			A		1.27						

Project:  
Location:  
Contract:  
Engineer:  
Filename: unbalance

ETAP  
12.6.0H  
  
Study Case: ULF

Page: 75  
Date: 05-03-2017  
SN:  
Revision: Base  
Config.: Normal

CKT / Branch				Cable & Reactor			Transformer				
ID	Conn.	Type	Phase	Ampacity (Amp)	Loading Amp	%	Capability (MVA)	Loading (input)		Loading (output)	
								MVA	%	MVA	%
T1 Al-masjid Al_kaber	3-Phase	Transformer	B		1.30						
			C		1.39						
			A				0.630	0.033	15.8	0.034	16.4
T2 Mothalath Al_borg	3-Phase	Transformer	B					0.030	14.4	0.026	12.4
			C					0.029	13.7	0.029	13.9
			A				0.630	0.033	15.8	0.034	16.4
T3 Maskaneh	3-Phase	Transformer	B					0.030	14.4	0.026	12.4
			C					0.029	13.7	0.029	13.9
			A				0.630	0.033	15.7	0.034	16.4
T4 Bear mtawi'	3-Phase	Transformer	B					0.030	14.4	0.026	12.4
			C					0.029	13.7	0.029	13.9
			A				0.630	0.022	10.6	0.019	9.2
T5 Wad algamary 1	3-Phase	Transformer	B					0.020	9.4	0.019	9.1
			C					0.022	10.7	0.024	11.3
			A				0.400	0.035	26.5	0.037	27.7
T6 Wad algamary 2	3-Phase	Transformer	B					0.037	27.5	0.035	26.1
			C					0.035	26.5	0.034	25.3
			A				0.250	0.010	11.6	0.008	9.6
T7 Al_deir 1	3-Phase	Transformer	B					0.008	9.5	0.007	9.0
			C					0.009	11.3	0.010	12.6
			A				0.630	0.042	19.8	0.040	19.0
T8 Karam al_ashqar	3-Phase	Transformer	B					0.040	19.2	0.039	18.8
			C					0.042	19.8	0.042	20.2
			A				0.250	0.016	18.9	0.019	22.4
T9 Abu al_humas	3-Phase	Transformer	B					0.023	27.8	0.024	29.0
			C					0.022	26.8	0.017	20.8
			A				0.630	0.042	19.8	0.040	19.0
T10 Meqtaa' duma	3-Phase	Transformer	B					0.040	19.2	0.039	18.7
			C					0.042	19.8	0.042	20.2
			A				0.630	0.028	13.4	0.029	13.8
T11 Wad ali	3-Phase	Transformer	B					0.033	15.6	0.033	15.9
			C					0.032	15.3	0.029	13.7
			A				0.250	0.036	42.9	0.034	40.9
T12 Aqabit gharrarah	3-Phase	Transformer	B					0.032	38.1	0.029	35.1
			C					0.031	37.2	0.034	40.2
			A				0.630	0.028	13.6	0.030	14.1
T13 Qata't al_jamal	3-Phase	Transformer	B					0.032	15.2	0.031	14.8
			C					0.030	14.3	0.028	13.4
			A				0.630	0.018	8.5	0.022	10.5
T14 Al_markaz	3-Phase	Transformer	B					0.019	9.3	0.016	7.7
			C					0.015	7.1	0.012	5.8
			A				0.630	0.024	11.3	0.024	11.6

Project:  
Location:  
Contract:  
Engineer:  
Filename: unbalance

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

Page: 76  
Date: 05-03-2017  
SN:  
Revision: Base  
Config.: Normal

CKT / Branch				Cable & Reactor			Transformer				
ID	Conn.	Type	Phase	Ampacity (Amp)	Loading Amp	%	Capability (MVA)	Loading (input)		Loading (output)	
								MVA	%	MVA	%
T15 Abu hashim	3-Phase	Transformer	B	0.250				0.025	12.0	0.027	12.7
			C					0.024	11.6	0.021	10.0
			A					0.043	51.1	0.043	51.0
T16 Sa'ada	3-Phase	Transformer	B	0.630				0.043	51.4	0.041	49.0
			C					0.041	49.1	0.041	48.8
			A					0.020	9.4	0.022	10.5
T17 Al_baladiya	3-Phase	Transformer	B	0.630				0.021	9.9	0.019	9.1
			C					0.019	9.0	0.017	8.1
			A					0.020	9.4	0.022	10.5
T18 Al_sheehk	3-Phase	Transformer	B	0.630				0.021	9.9	0.019	9.1
			C					0.019	9.0	0.017	8.1
			A					0.043	20.6	0.044	21.0
T19 Kerbit alama	3-Phase	Transformer	B	0.630				0.042	19.8	0.038	18.3
			C					0.041	19.7	0.041	19.7
			A					0.012	5.9	0.011	5.1
T20 Aqabit al_tarsha	3-Phase	Transformer	B	0.250				0.011	5.4	0.012	5.9
			C					0.013	6.2	0.013	6.2
			A					0.027	31.9	0.025	30.1
T21 Al_mustashfah	3-Phase	Transformer	B	0.630				0.026	30.7	0.025	29.8
			C					0.025	29.7	0.026	30.9
			A					0.018	8.4	0.022	10.5
T22 Da'na	3-Phase	Transformer	B	0.630				0.019	9.2	0.016	7.7
			C					0.015	7.0	0.012	5.8
			A					0.008	4.0	0.009	4.1
T23 Kurza	3-Phase	Transformer	B	0.630				0.009	4.5	0.009	4.5
			C					0.010	4.5	0.008	4.0
			A					0.027	12.6	0.025	11.9
T24 Al-deire 2	3-Phase	Transformer	B	0.630				0.026	12.2	0.025	11.8
			C					0.025	11.8	0.026	12.2
			A					0.009	4.0	0.009	4.1
T25 Rasmi wahab	3-Phase	Transformer	B	0.250				0.009	4.5	0.009	4.5
			C					0.010	4.5	0.008	4.0
			A					0.009	10.2	0.009	10.4
T26 Baten alqar'	3-Phase	Transformer	B	0.250				0.009	11.3	0.009	11.3
			C					0.010	11.4	0.008	10.1
			A					0.021	24.8	0.021	25.1
T27 Al_muntazah	3-Phase	Transformer	B	0.250				0.022	27.0	0.022	26.9
			C					0.022	26.7	0.021	24.8
			A					0.009	11.3	0.008	9.6
T28 Domet al_wridat	3-Phase	Transformer	B	0.630				0.008	9.5	0.007	9.0
			C					0.009	11.0	0.010	12.0
			A					0.025	12.1	0.023	11.0

Project:  
Location:  
Contract:  
Engineer:  
Filename: unbalance

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

Page: 77  
Date: 05-03-2017  
SN:  
Revision: Base  
Config.: Normal

CKT / Branch				Cable & Reactor			Transformer				
ID	Conn.	Type	Phase	Ampacity (Amp)	Loading Amp	%	Capability (MVA)	Loading (input)		Loading (output)	
								MVA	%	MVA	%
T29 Juret al_dama	3-Phase	Transformer	B	0.630				0.023	10.9	0.022	10.3
			C					0.024	11.2	0.026	12.4
			A					0.025	12.0	0.025	11.9
T30 Kafar joul	3-Phase	Transformer	B	0.250				0.028	13.2	0.030	14.2
			C					0.028	13.5	0.025	11.9
			A					0.021	24.7	0.020	24.4
T31 Sam'a	3-Phase	Transformer	B	0.250				0.018	21.6	0.014	16.7
			C					0.014	16.7	0.017	20.6
			A					0.005	6.2	0.004	5.1
T32 Khalet al_ayaseh	3-Phase	Transformer	B	0.630				0.005	5.8	0.006	6.6
			C					0.006	7.5	0.006	6.8
			A					0.007	3.3	0.007	3.5
T33 Al_mizrab	3-Phase	Transformer	B	0.250				0.009	4.5	0.011	5.4
			C					0.010	4.8	0.007	3.2
			A					0.006	7.3	0.006	7.4
T34 Al_shadaqa	3-Phase	Transformer	B	0.250				0.006	7.5	0.005	6.5
			C					0.005	6.4	0.005	6.4
			A					0.006	7.3	0.006	7.4
T35 Al_shuqfan	3-Phase	Transformer	B	0.250				0.006	7.5	0.005	6.5
			C					0.005	6.4	0.005	6.4
			A					0.014	17.2	0.014	17.1
T36 Al_estad	3-Phase	Transformer	B	0.250				0.015	17.5	0.014	17.0
			C					0.014	17.1	0.014	16.7
			A					0.006	7.3	0.006	7.4
T37 Eshreetch	3-Phase	Transformer	B	0.630				0.006	7.5	0.005	6.5
			C					0.005	6.4	0.005	6.4
			A					0.020	9.5	0.019	9.0
T38 Al_muhtasib	3-Phase	Transformer	B	0.630				0.017	7.9	0.014	6.8
			C					0.018	8.7	0.021	9.8
			A					0.014	6.8	0.010	5.0
T39 Jammoq	3-Phase	Transformer	B	0.630				0.012	5.6	0.013	6.4
			C					0.015	7.3	0.016	7.8
			A					0.019	9.2	0.019	9.2
T40 Al_helal	3-Phase	Transformer	B	0.250				0.019	9.2	0.020	9.3
			C					0.019	8.9	0.018	8.4
			A					0.003	3.5	0.003	3.3
T41 Al_muntazah 2	3-Phase	Transformer	B	0.250				0.003	3.2	0.002	2.2
			C					0.002	2.5	0.002	2.8
			A					0.013	15.4	0.013	15.6
T42 Abu njeem 2	3-Phase	Transformer	B	0.250				0.011	13.2	0.008	9.6
			C					0.010	11.9	0.012	14.0
			A					0.012	13.9	0.013	15.0

Project:  
Location:  
Contract:  
Engineer:  
Filename: unbalance

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

Page: 78  
Date: 05-03-2017  
SN:  
Revision: Base  
Config.: Normal

CKT / Branch				Cable & Reactor			Transformer				
ID	Conn.	Type	Phase	Ampacity (Amp)	Loading Amp	%	Capability (MVA)	Loading (input)		Loading (output)	
								MVA	%	MVA	%
T43 Al_jame'a	3-Phase	Transformer	B	0.630				0.013	15.0	0.011	12.8
			C					0.010	11.5	0.010	11.6
			A					0.012	5.5	0.007	3.3
T44 Al_ghwla	3-Phase	Transformer	B	0.250				0.010	4.9	0.013	6.1
			C					0.014	6.8	0.015	7.1
			A					0.005	5.9	0.005	6.2
T45 Masafi	3-Phase	Transformer	B	0.630				0.004	5.2	0.002	3.0
			C					0.004	4.5	0.004	5.4
			A					0.018	8.6	0.020	9.5
T46 Al_jebreni	3-Phase	Transformer	B	0.630				0.017	8.1	0.013	6.4
			C					0.015	7.1	0.016	7.4
			A					0.024	11.5	0.022	10.4
T47 Abu_njeem I	3-Phase	Transformer	B	0.160				0.025	11.8	0.027	12.8
			C					0.026	12.6	0.025	11.8
			A					0.006	11.8	0.006	11.6
T48 Inab_al_kabeer	3-Phase	Transformer	B	0.250				0.006	10.6	0.005	9.2
			C					0.005	10.2	0.006	10.9
			A					0.004	5.3	0.004	5.2
T49 Shweki	3-Phase	Transformer	B	0.630				0.006	6.8	0.006	7.7
			C					0.006	7.1	0.005	5.6
			A					0.006	7.1	0.005	5.6
T50 Al-baha	3-Phase	Transformer	B	0.630				0.006	7.1	0.005	5.6
			C					0.006	7.1	0.005	5.6
			A					0.004	2.1	0.004	2.0
T51 Inab_al_sagher	3-Phase	Transformer	B	0.250				0.006	2.7	0.006	3.0
			C					0.006	2.8	0.005	2.2
			A					0.006	2.8	0.005	2.2
T52 Bank_al_eskan	3-Phase	Transformer	B	0.630				0.019	9.2	0.019	9.1
			C					0.019	9.2	0.020	9.3
			A					0.019	8.9	0.018	8.3
T53 Al_tork	3-Phase	Transformer	B	0.250				0.020	23.9	0.020	24.2
			C					0.020	23.5	0.017	20.1
			A					0.018	21.5	0.019	23.3
T54 Wad_algamy 3	3-Phase	Transformer	B	0.630				0.006	3.0	0.006	2.9
			C					0.006	2.7	0.005	2.3
			A					0.005	2.6	0.006	2.8
T55 Mana'	3-Phase	Transformer	B	0.630				0.032	15.2	0.031	14.7
			C					0.035	16.8	0.037	17.6
			A					0.038	17.9	0.033	15.9
T55 Mana'	3-Phase	Transformer	B	0.630				0.006	3.0	0.006	2.9
			C					0.006	2.7	0.005	2.3
			A					0.005	2.6	0.006	2.8
T55 Mana'	3-Phase	Transformer	B	0.630				0.008	3.6	0.008	3.8
			C					0.007	3.4	0.005	2.6
			A					0.006	3.1	0.007	3.2

Project:	ETAP	Page:	79
Location:	12.6.0H	Date:	05-03-2017
Contract:		SN:	
Engineer:	Study Case: ULF	Revision:	Base
Filename: unbalance		Config.:	Normal

---

---

\* Indicates a branch with operating load exceeding the branch capability.  
For branches below center-tap transformers, Phases A, B, and C correspond to (1), (2) and (N) respectively.

Project:  
Location:  
Contract:  
Engineer:  
Filename: unbalance

ETAP  
12.6.0H  
  
Study Case: ULF

Page: 80  
Date: 05-03-2017  
SN:  
Revision: Base  
Config.: Normal

### Branch Losses Summary Report

CKT / Branch		From-To Bus Flow		To-From Bus Flow		Losses		% Bus Voltage		Vd % Drop in Vmag	Amperes in Buried Winding
ID	Phase	MW	Mvar	MW	Mvar	kW	kvar	From	To		
C.20	A	0.077	0.030	-0.077	-0.030	0.0	0.0	99.9	99.9	0.00	0.00
	B	0.072	0.033	-0.072	-0.033	0.0	0.0	99.9	99.9	0.00	0.00
	C	0.073	0.027	-0.073	-0.027	0.0	0.0	99.9	99.9	0.00	0.00
C56	A	0.053	0.021	-0.053	-0.021	0.0	0.0	99.9	99.9	0.00	0.00
	B	0.050	0.023	-0.050	-0.023	0.0	0.0	99.9	99.9	0.00	0.00
	C	0.050	0.019	-0.050	-0.019	0.0	0.0	99.9	99.9	0.00	0.00
C59	A	0.269	0.106	-0.269	-0.106	0.0	0.0	100.0	100.0	0.00	0.00
	B	0.262	0.122	-0.262	-0.122	0.0	0.0	99.9	99.9	0.00	0.00
	C	0.252	0.108	-0.252	-0.108	0.0	0.0	100.0	100.0	0.00	0.00
C60	A	0.000	0.000	0.000	0.000	0.0	0.0	99.9	99.9	0.00	0.00
	B	0.000	0.000	0.000	0.000	0.0	0.0	99.9	99.9	0.00	0.00
	C	0.000	0.000	0.000	0.000	0.0	0.0	99.9	99.9	0.00	0.00
C61	A	0.295	0.123	-0.295	-0.123	0.0	0.0	100.0	100.0	0.00	0.00
	B	0.288	0.136	-0.288	-0.136	0.0	0.0	100.0	100.0	0.00	0.00
	C	0.280	0.123	-0.280	-0.123	0.0	0.0	100.0	100.0	0.00	0.00
C80	A	0.046	0.018	-0.046	-0.018	0.0	0.0	99.9	99.9	0.00	0.00
	B	0.046	0.017	-0.046	-0.017	0.0	0.0	99.9	99.9	0.00	0.00
	C	0.047	0.018	-0.047	-0.018	0.0	0.0	99.9	99.9	0.00	0.00
C96	A	0.644	0.267	-0.644	-0.267	0.0	0.0	100.0	100.0	0.01	0.00
	B	0.641	0.277	-0.641	-0.277	0.0	0.0	100.0	100.0	0.01	0.00
	C	0.634	0.269	-0.634	-0.269	0.0	0.0	100.0	100.0	0.01	0.00
C97	A	0.459	0.196	-0.459	-0.196	0.0	0.0	99.9	99.9	0.01	0.00
	B	0.464	0.200	-0.464	-0.200	0.0	0.0	99.9	99.9	0.01	0.00
	C	0.458	0.203	-0.458	-0.203	0.0	0.0	99.9	99.9	0.01	0.00
C100	A	0.023	0.007	-0.023	-0.007	0.0	0.0	99.9	99.9	0.00	0.00
	B	0.024	0.007	-0.024	-0.007	0.0	0.0	99.9	99.9	0.00	0.00
	C	0.023	0.008	-0.023	-0.008	0.0	0.0	99.9	99.9	0.00	0.00
C107	A	0.027	0.009	-0.027	-0.009	0.0	0.0	99.8	99.8	0.00	0.00
	B	0.030	0.010	-0.030	-0.010	0.0	0.0	99.8	99.8	0.00	0.00
	C	0.028	0.012	-0.028	-0.012	0.0	0.0	99.8	99.8	0.00	0.00
C117	A	0.080	0.043	-0.080	-0.043	0.0	0.0	99.8	99.8	0.00	0.00
	B	0.084	0.048	-0.084	-0.048	0.0	0.0	99.8	99.8	0.00	0.00
	C	0.077	0.048	-0.077	-0.048	0.0	0.0	99.8	99.8	0.00	0.00
C120	A	0.406	0.171	-0.406	-0.171	0.0	0.0	99.9	99.9	0.01	0.00
	B	0.413	0.174	-0.413	-0.174	0.0	0.0	99.9	99.9	0.01	0.00
	C	0.407	0.178	-0.407	-0.178	0.0	0.0	99.9	99.9	0.01	0.00
C128	A	0.564	0.238	-0.564	-0.238	0.0	0.0	99.9	99.9	0.01	0.00
	B	0.566	0.243	-0.566	-0.243	0.0	0.0	99.9	99.9	0.01	0.00
	C	0.560	0.242	-0.560	-0.242	0.0	0.0	99.9	99.9	0.01	0.00
C160	A	0.465	0.199	-0.465	-0.199	0.0	0.0	99.9	99.9	0.01	0.00
	B	0.469	0.203	-0.469	-0.203	0.0	0.0	99.9	99.9	0.01	0.00
	C	0.463	0.205	-0.463	-0.205	0.0	0.0	99.9	99.9	0.01	0.00



Project:  
Location:  
Contract:  
Engineer:  
Filename: unbalance

ETAP  
12.6.0H  
  
Study Case: ULF

Page: 81  
Date: 05-03-2017  
SN:  
Revision: Base  
Config.: Normal

CKT / Branch		From-To Bus Flow		To-From Bus Flow		Losses		% Bus Voltage		Vd % Drop in Vmag	Amperes in Buried Winding
ID	Phase	MW	Mvar	MW	Mvar	kW	kvar	From	To		
C162	A	0.517	0.219	-0.517	-0.219	0.0	0.0	99.9	99.9	0.01	0.00
	B	0.519	0.226	-0.519	-0.226	0.0	0.0	99.9	99.9	0.01	0.00
	C	0.513	0.224	-0.513	-0.224	0.0	0.0	99.9	99.9	0.01	0.00
C163	A	0.263	0.116	-0.263	-0.116	0.0	0.0	99.9	99.9	0.00	0.00
	B	0.275	0.116	-0.275	-0.116	0.0	0.0	99.9	99.8	0.01	0.00
	C	0.270	0.127	-0.270	-0.127	0.0	0.0	99.9	99.9	0.01	0.00
C191	A	0.465	0.199	-0.465	-0.199	0.0	0.0	99.9	99.9	0.01	0.00
	B	0.469	0.203	-0.469	-0.203	0.0	0.0	99.9	99.9	0.01	0.00
	C	0.463	0.205	-0.463	-0.205	0.0	0.0	99.9	99.9	0.01	0.00
C193	A	0.008	0.006	-0.008	-0.006	0.0	0.0	99.9	99.9	0.00	0.00
	B	0.007	0.004	-0.007	-0.004	0.0	0.0	99.9	99.9	0.00	0.00
	C	0.009	0.004	-0.009	-0.004	0.0	0.0	100.0	100.0	0.00	0.00
C203	A	0.113	0.049	-0.113	-0.049	0.0	0.0	99.8	99.8	0.00	0.00
	B	0.118	0.039	-0.118	-0.039	0.0	0.0	99.8	99.8	0.00	0.00
	C	0.124	0.049	-0.124	-0.049	0.0	0.0	99.8	99.8	0.00	0.00
C216	A	0.406	0.171	-0.406	-0.171	0.0	0.0	99.9	99.9	0.01	0.00
	B	0.413	0.174	-0.413	-0.174	0.0	0.0	99.9	99.9	0.01	0.00
	C	0.407	0.178	-0.407	-0.178	0.0	0.0	99.9	99.9	0.01	0.00
C246	A	0.583	0.243	-0.583	-0.243	0.1	0.1	100.0	99.9	0.02	0.00
	B	0.586	0.250	-0.585	-0.250	0.1	0.1	99.9	99.9	0.02	0.00
	C	0.578	0.249	-0.578	-0.249	0.1	0.1	100.0	99.9	0.02	0.00
C280	A	0.019	0.006	-0.019	-0.006	0.0	0.0	99.9	99.9	0.00	0.00
	B	0.016	0.005	-0.016	-0.005	0.0	0.0	99.8	99.8	0.00	0.00
	C	0.018	0.003	-0.018	-0.003	0.0	0.0	99.9	99.9	0.00	0.00
C319	A	0.020	0.025	-0.020	-0.025	0.0	0.0	99.8	99.8	0.00	0.00
	B	0.026	0.024	-0.026	-0.024	0.0	0.0	99.8	99.8	0.00	0.00
	C	0.024	0.029	-0.024	-0.029	0.0	0.0	99.8	99.8	0.00	0.00
C322	A	0.113	0.049	-0.113	-0.049	0.0	0.0	99.8	99.8	0.00	0.00
	B	0.118	0.039	-0.118	-0.039	0.0	0.0	99.8	99.8	0.00	0.00
	C	0.124	0.049	-0.124	-0.049	0.0	0.0	99.8	99.8	0.00	0.00
C330	A	0.006	0.002	-0.006	-0.002	0.0	0.0	100.0	100.0	0.00	0.00
	B	0.005	0.003	-0.005	-0.003	0.0	0.0	99.9	99.9	0.00	0.00
	C	0.005	0.002	-0.005	-0.002	0.0	0.0	100.0	100.0	0.00	0.00
C352	A	0.136	0.050	-0.136	-0.050	0.0	0.0	99.9	99.9	0.01	0.00
	B	0.133	0.058	-0.133	-0.058	0.0	0.0	99.9	99.9	0.01	0.00
	C	0.127	0.051	-0.127	-0.051	0.0	0.0	99.9	99.9	0.01	0.00
C361	A	0.344	0.145	-0.344	-0.145	0.0	0.0	99.9	99.9	0.01	0.00
	B	0.352	0.148	-0.352	-0.148	0.0	0.0	99.9	99.9	0.01	0.00
	C	0.346	0.153	-0.346	-0.153	0.0	0.0	99.9	99.9	0.01	0.00
C365	A	0.244	0.112	-0.244	-0.112	0.0	0.0	99.9	99.9	0.01	0.00
	B	0.257	0.110	-0.257	-0.110	0.0	0.0	99.8	99.8	0.01	0.00
	C	0.252	0.122	-0.252	-0.122	0.0	0.0	99.9	99.9	0.01	0.00
C368	A	0.039	0.017	-0.039	-0.017	0.0	0.0	99.9	99.9	0.00	0.00
	B	0.038	0.019	-0.038	-0.019	0.0	0.0	99.9	99.9	0.00	0.00
	C	0.037	0.017	-0.037	-0.017	0.0	0.0	99.9	99.9	0.00	0.00

Project:  
Location:  
Contract:  
Engineer:  
Filename: unbalance

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

Page: 82  
Date: 05-03-2017  
SN:  
Revision: Base  
Config.: Normal

CKT / Branch		From-To Bus Flow		To-From Bus Flow		Losses		% Bus Voltage		Vd % Drop in Vmag	Amperes in Buried Winding
ID	Phase	MW	Mvar	MW	Mvar	kW	kvar	From	To		
C399	A	0.087	0.047	-0.087	-0.047	0.0	0.0	99.8	99.8	0.00	0.00
	B	0.092	0.053	-0.092	-0.053	0.0	0.0	99.8	99.8	0.00	0.00
	C	0.085	0.054	-0.085	-0.054	0.0	0.0	99.8	99.8	0.00	0.00
C409	A	0.019	0.005	-0.019	-0.005	0.0	0.0	99.9	99.9	0.00	0.00
	B	0.018	0.005	-0.018	-0.005	0.0	0.0	99.8	99.8	0.00	0.00
	C	0.018	0.005	-0.018	-0.005	0.0	0.0	99.9	99.9	0.00	0.00
C419	A	0.019	0.006	-0.019	-0.006	0.0	0.0	99.9	99.9	0.00	0.00
	B	0.016	0.005	-0.016	-0.005	0.0	0.0	99.8	99.8	0.00	0.00
	C	0.018	0.003	-0.018	-0.003	0.0	0.0	99.9	99.9	0.00	0.00
C422	A	0.040	0.020	-0.040	-0.020	0.0	0.0	99.9	99.9	0.00	0.00
	B	0.040	0.020	-0.040	-0.020	0.0	0.0	99.9	99.9	0.00	0.00
	C	0.040	0.020	-0.040	-0.020	0.0	0.0	100.0	100.0	0.00	0.00
C440	A	0.004	0.003	-0.004	-0.003	0.0	0.0	99.9	99.9	0.00	0.00
	B	0.005	0.002	-0.005	-0.002	0.0	0.0	99.9	99.9	0.00	0.00
	C	0.006	0.003	-0.006	-0.003	0.0	0.0	99.9	99.9	0.00	0.00
C450	A	0.022	0.012	-0.022	-0.012	0.0	0.0	99.9	99.9	0.00	0.00
	B	0.026	0.011	-0.026	-0.011	0.0	0.0	99.9	99.9	0.00	0.00
	C	0.025	0.014	-0.025	-0.014	0.0	0.0	99.9	99.9	0.00	0.00
C.450	A	0.021	0.012	-0.021	-0.012	0.0	0.0	99.8	99.8	0.00	0.00
	B	0.022	0.011	-0.022	-0.011	0.0	0.0	99.8	99.8	0.00	0.00
	C	0.023	0.013	-0.023	-0.013	0.0	0.0	99.8	99.8	0.00	0.00
C461	A	0.006	0.003	-0.006	-0.003	0.0	0.0	99.8	99.8	0.00	0.00
	B	0.009	0.002	-0.009	-0.002	0.0	0.0	99.8	99.8	0.00	0.00
	C	0.009	0.005	-0.009	-0.005	0.0	0.0	99.8	99.8	0.00	0.00
C462	A	0.025	0.011	-0.025	-0.011	0.0	0.0	99.9	99.9	0.00	0.00
	B	0.021	0.010	-0.021	-0.010	0.0	0.0	99.9	99.8	0.00	0.00
	C	0.023	0.007	-0.023	-0.007	0.0	0.0	99.9	99.9	0.00	0.00
C463	A	0.006	0.002	-0.006	-0.002	0.0	0.0	100.0	100.0	0.00	0.00
	B	0.005	0.003	-0.005	-0.003	0.0	0.0	99.9	99.9	0.00	0.00
	C	0.005	0.002	-0.005	-0.002	0.0	0.0	100.0	100.0	0.00	0.00
C473	A	0.619	0.259	-0.619	-0.259	0.2	0.1	100.0	100.0	0.03	0.00
	B	0.617	0.268	-0.616	-0.268	0.2	0.1	100.0	99.9	0.03	0.00
	C	0.610	0.262	-0.610	-0.262	0.2	0.1	100.0	100.0	0.03	0.00
C476	A	0.041	0.013	-0.041	-0.013	0.0	0.0	99.8	99.8	0.00	0.00
	B	0.038	0.018	-0.038	-0.018	0.0	0.0	99.8	99.8	0.00	0.00
	C	0.036	0.013	-0.036	-0.013	0.0	0.0	99.8	99.8	0.00	0.00
C514	A	0.057	0.025	-0.057	-0.025	0.0	0.0	100.0	100.0	0.00	0.00
	B	0.056	0.028	-0.056	-0.028	0.0	0.0	99.9	99.9	0.00	0.00
	C	0.054	0.025	-0.054	-0.025	0.0	0.0	100.0	100.0	0.00	0.00
C517	A	0.045	0.023	-0.045	-0.023	0.0	0.0	99.8	99.8	0.00	0.00
	B	0.045	0.016	-0.045	-0.016	0.0	0.0	99.8	99.8	0.00	0.00
	C	0.050	0.020	-0.050	-0.020	0.0	0.0	99.8	99.8	0.00	0.00
C518	A	0.070	0.031	-0.070	-0.031	0.0	0.0	99.8	99.8	0.00	0.00
	B	0.069	0.025	-0.069	-0.025	0.0	0.0	99.8	99.8	0.00	0.00
	C	0.074	0.027	-0.074	-0.027	0.0	0.0	99.8	99.8	0.00	0.00

Project:  
Location:  
Contract:  
Engineer:  
Filename: unbalance

ETAP  
12.6.0H  
  
Study Case: ULF

Page: 83  
Date: 05-03-2017  
SN:  
Revision: Base  
Config.: Normal

CKT / Branch		From-To Bus Flow		To-From Bus Flow		Losses		% Bus Voltage		Vd % Drop in Vmag	Amperes in Buried Winding
ID	Phase	MW	Mvar	MW	Mvar	kW	kvar	From	To		
C526	A	0.052	0.023	-0.052	-0.023	0.0	0.0	100.0	99.9	0.00	0.00
	B	0.051	0.025	-0.051	-0.025	0.0	0.0	99.9	99.9	0.00	0.00
	C	0.049	0.024	-0.049	-0.024	0.0	0.0	100.0	100.0	0.00	0.00
C558	A	0.014	0.005	-0.014	-0.005	0.0	0.0	99.9	99.9	0.00	0.00
	B	0.014	0.005	-0.014	-0.005	0.0	0.0	99.9	99.9	0.00	0.00
	C	0.013	0.005	-0.013	-0.005	0.0	0.0	99.9	99.9	0.00	0.00
C577	A	0.097	0.039	-0.097	-0.039	0.0	0.0	99.8	99.8	0.01	0.00
	B	0.099	0.035	-0.099	-0.035	0.0	0.0	99.8	99.8	0.01	0.00
	C	0.102	0.039	-0.102	-0.039	0.0	0.0	99.8	99.8	0.01	0.00
C587	A	0.024	0.008	-0.024	-0.008	0.0	0.0	99.8	99.8	0.00	0.00
	B	0.021	0.008	-0.021	-0.008	0.0	0.0	99.8	99.8	0.00	0.00
	C	0.023	0.006	-0.023	-0.006	0.0	0.0	99.8	99.8	0.00	0.00
C603	A	0.227	0.106	-0.227	-0.106	0.0	0.0	99.9	99.8	0.02	0.00
	B	0.242	0.102	-0.241	-0.102	0.0	0.0	99.8	99.8	0.02	0.00
	C	0.237	0.117	-0.237	-0.117	0.0	0.0	99.9	99.8	0.02	0.00
C622	A	0.007	0.005	-0.007	-0.005	0.0	0.0	99.9	99.9	0.00	0.00
	B	0.008	0.005	-0.008	-0.005	0.0	0.0	99.9	99.9	0.00	0.00
	C	0.008	0.006	-0.008	-0.006	0.0	0.0	99.9	99.9	0.00	0.00
C727	A	0.023	0.007	-0.023	-0.007	0.0	0.0	99.9	99.9	0.00	0.00
	B	0.024	0.007	-0.024	-0.007	0.0	0.0	99.9	99.9	0.00	0.00
	C	0.023	0.008	-0.023	-0.008	0.0	0.0	99.9	99.9	0.00	0.00
C728	A	0.042	0.015	-0.042	-0.015	0.0	0.0	99.9	99.9	0.00	0.00
	B	0.038	0.020	-0.038	-0.020	0.0	0.0	99.9	99.9	0.00	0.00
	C	0.036	0.014	-0.036	-0.014	0.0	0.0	99.9	99.9	0.00	0.00
C806	A	0.123	0.045	-0.123	-0.045	0.0	0.0	99.9	99.9	0.01	0.00
	B	0.119	0.053	-0.119	-0.053	0.0	0.0	99.9	99.9	0.01	0.00
	C	0.114	0.046	-0.114	-0.046	0.0	0.0	99.9	99.9	0.01	0.00
C811	A	0.038	0.013	-0.038	-0.013	0.0	0.0	99.9	99.9	0.00	0.00
	B	0.034	0.014	-0.034	-0.014	0.0	0.0	99.9	99.9	0.00	0.00
	C	0.036	0.010	-0.036	-0.010	0.0	0.0	99.9	99.9	0.00	0.00
C815	A	0.033	0.019	-0.033	-0.019	0.0	0.0	99.8	99.8	0.00	0.00
	B	0.034	0.014	-0.034	-0.014	0.0	0.0	99.8	99.8	0.00	0.00
	C	0.038	0.017	-0.038	-0.017	0.0	0.0	99.8	99.8	0.00	0.00
C880	A	0.021	0.012	-0.021	-0.012	0.0	0.0	99.8	99.8	0.00	0.00
	B	0.022	0.011	-0.022	-0.011	0.0	0.0	99.8	99.8	0.00	0.00
	C	0.023	0.013	-0.023	-0.013	0.0	0.0	99.8	99.8	0.00	0.00
Co14	A	0.000	0.000	0.000	0.000	0.0	0.0	99.9	99.9	0.00	0.00
	B	0.000	0.000	0.000	0.000	0.0	0.0	99.9	99.9	0.00	0.00
	C	0.000	0.000	0.000	0.000	0.0	0.0	99.9	99.9	0.00	0.00
Co57	A	0.020	0.025	-0.020	-0.025	0.0	0.0	99.8	99.8	0.00	0.00
	B	0.026	0.024	-0.026	-0.024	0.0	0.0	99.8	99.8	0.00	0.00
	C	0.024	0.029	-0.024	-0.029	0.0	0.0	99.8	99.8	0.00	0.00
Co58	A	0.032	0.014	-0.032	-0.014	0.0	0.0	99.9	99.9	0.00	0.00
	B	0.029	0.016	-0.029	-0.016	0.0	0.0	99.9	99.9	0.00	0.00
	C	0.030	0.012	-0.030	-0.012	0.0	0.0	99.9	99.9	0.00	0.00

Project:  
Location:  
Contract:  
Engineer:  
Filename: unbalance

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

Page: 84  
Date: 05-03-2017  
SN:  
Revision: Base  
Config.: Normal

CKT / Branch		From-To Bus Flow		To-From Bus Flow		Losses		% Bus Voltage		Vd % Drop in Vmag	Amperes in Buried Winding
ID	Phase	MW	Mvar	MW	Mvar	kW	kvar	From	To		
Co130	A	0.211	0.081	-0.211	-0.081	0.0	0.0	99.9	99.9	0.00	0.00
	B	0.206	0.094	-0.206	-0.094	0.0	0.0	99.9	99.9	0.00	0.00
	C	0.198	0.083	-0.198	-0.083	0.0	0.0	99.9	99.9	0.00	0.00
Co260	A	0.000	0.000	0.000	0.000	0.0	0.0	99.9	99.9	0.00	0.00
	B	0.000	0.000	0.000	0.000	0.0	0.0	99.9	99.9	0.00	0.00
	C	0.000	0.000	0.000	0.000	0.0	0.0	99.9	99.9	0.00	0.00
Co261	A	0.010	0.004	-0.010	-0.004	0.0	0.0	99.9	99.9	0.00	0.00
	B	0.009	0.005	-0.009	-0.005	0.0	0.0	99.9	99.9	0.00	0.00
	C	0.008	0.003	-0.008	-0.003	0.0	0.0	99.9	99.9	0.00	0.00
Co294	A	0.024	0.012	-0.024	-0.012	0.0	0.0	99.9	99.9	0.00	0.00
	B	0.022	0.011	-0.022	-0.011	0.0	0.0	99.9	99.9	0.00	0.00
	C	0.023	0.010	-0.023	-0.010	0.0	0.0	99.9	99.9	0.00	0.00
Co528	A	0.005	0.002	-0.005	-0.002	0.0	0.0	99.9	99.9	0.00	0.00
	B	0.004	0.002	-0.004	-0.002	0.0	0.0	99.9	99.9	0.00	0.00
	C	0.004	0.001	-0.004	-0.001	0.0	0.0	99.9	99.9	0.00	0.00
Co600	A	0.211	0.082	-0.211	-0.081	0.0	0.0	100.0	99.9	0.01	0.00
	B	0.206	0.094	-0.206	-0.094	0.0	0.0	99.9	99.9	0.01	0.00
	C	0.198	0.083	-0.198	-0.083	0.0	0.0	100.0	99.9	0.01	0.00
Co645	A	0.010	0.004	-0.010	-0.004	0.0	0.0	99.9	99.9	0.00	0.00
	B	0.009	0.005	-0.009	-0.005	0.0	0.0	99.9	99.9	0.00	0.00
	C	0.008	0.003	-0.008	-0.003	0.0	0.0	99.9	99.9	0.00	0.00
Co999	A	0.030	0.013	-0.030	-0.013	0.0	0.0	99.9	99.9	0.00	0.00
	B	0.027	0.014	-0.027	-0.014	0.0	0.0	99.9	99.9	0.00	0.00
	C	0.028	0.012	-0.028	-0.012	0.0	0.0	99.9	99.9	0.00	0.00
Co.1032	A	0.000	0.000	0.000	0.000	0.0	0.0	99.9	99.9	0.00	0.00
	B	0.000	0.000	0.000	0.000	0.0	0.0	99.9	99.9	0.00	0.00
	C	0.000	0.000	0.000	0.000	0.0	0.0	99.9	99.9	0.00	0.00
D240	A	0.004	0.002	-0.004	-0.002	0.0	0.0	99.9	99.9	0.00	0.00
	B	0.005	0.002	-0.005	-0.002	0.0	0.0	99.9	99.9	0.00	0.00
	C	0.005	0.003	-0.005	-0.003	0.0	0.0	99.9	99.9	0.00	0.00
D256	A	0.004	0.002	-0.004	-0.002	0.0	0.0	99.9	99.9	0.00	0.00
	B	0.005	0.002	-0.005	-0.002	0.0	0.0	99.9	99.9	0.00	0.00
	C	0.005	0.003	-0.005	-0.003	0.0	0.0	99.9	99.9	0.00	0.00
D276	A	0.004	0.002	-0.004	-0.002	0.0	0.0	99.9	99.9	0.00	0.00
	B	0.005	0.002	-0.005	-0.002	0.0	0.0	99.9	99.9	0.00	0.00
	C	0.005	0.003	-0.005	-0.003	0.0	0.0	99.9	99.9	0.00	0.00
D634	A	0.016	0.006	-0.016	-0.006	0.0	0.0	99.9	99.9	0.00	0.00
	B	0.015	0.007	-0.015	-0.007	0.0	0.0	99.9	99.9	0.00	0.00
	C	0.015	0.006	-0.015	-0.006	0.0	0.0	99.9	99.9	0.00	0.00
D655	A	0.024	0.012	-0.024	-0.012	0.0	0.0	99.9	99.9	0.00	0.00
	B	0.022	0.011	-0.022	-0.011	0.0	0.0	99.9	99.9	0.00	0.00
	C	0.023	0.010	-0.023	-0.010	0.0	0.0	99.9	99.9	0.00	0.00
D711	A	0.024	0.012	-0.024	-0.012	0.0	0.0	99.9	99.9	0.00	0.00
	B	0.022	0.011	-0.022	-0.011	0.0	0.0	99.9	99.9	0.00	0.00
	C	0.023	0.010	-0.023	-0.010	0.0	0.0	99.9	99.9	0.00	0.00

Project:  
Location:  
Contract:  
Engineer:  
Filename: unbalance

ETAP  
12.6.0H  
  
Study Case: ULF

Page: 85  
Date: 05-03-2017  
SN:  
Revision: Base  
Config.: Normal

CKT / Branch		From-To Bus Flow		To-From Bus Flow		Losses		% Bus Voltage		Vd % Drop in Vmag	Amperes in Buried Winding
ID	Phase	MW	Mvar	MW	Mvar	kW	kvar	From	To		
D718	A	0.004	0.002	-0.004	-0.002	0.0	0.0	99.9	99.9	0.00	0.00
	B	0.005	0.002	-0.005	-0.002	0.0	0.0	99.9	99.9	0.00	0.00
	C	0.005	0.003	-0.005	-0.003	0.0	0.0	99.9	99.9	0.00	0.00
R10	A	0.005	0.002	-0.005	-0.002	0.0	0.0	99.9	99.9	0.00	0.00
	B	0.004	0.002	-0.004	-0.002	0.0	0.0	99.9	99.9	0.00	0.00
	C	0.004	0.001	-0.004	-0.001	0.0	0.0	99.9	99.9	0.00	0.00
R36	A	0.939	0.390	-0.939	-0.390	0.1	0.0	100.0	100.0	0.01	0.00
	B	0.928	0.413	-0.928	-0.413	0.1	0.0	100.0	100.0	0.01	0.00
	C	0.914	0.392	-0.914	-0.392	0.1	0.0	100.0	100.0	0.01	0.00
R45	A	0.077	0.030	-0.077	-0.030	0.0	0.0	99.9	99.9	0.00	0.00
	B	0.072	0.033	-0.072	-0.033	0.0	0.0	99.9	99.9	0.00	0.00
	C	0.073	0.027	-0.073	-0.027	0.0	0.0	99.9	99.9	0.00	0.00
R106	A	0.295	0.123	-0.295	-0.123	0.0	0.0	100.0	100.0	0.01	0.00
	B	0.288	0.136	-0.288	-0.136	0.0	0.0	100.0	100.0	0.01	0.00
	C	0.280	0.123	-0.280	-0.123	0.0	0.0	100.0	100.0	0.01	0.00
R150	A	0.077	0.030	-0.077	-0.030	0.0	0.0	99.9	99.9	0.00	0.00
	B	0.072	0.033	-0.072	-0.033	0.0	0.0	99.9	99.9	0.00	0.00
	C	0.073	0.027	-0.073	-0.027	0.0	0.0	99.9	99.9	0.00	0.00
R164	A	0.155	0.055	-0.155	-0.055	0.0	0.0	99.9	99.9	0.00	0.00
	B	0.151	0.065	-0.151	-0.065	0.0	0.0	99.9	99.9	0.00	0.00
	C	0.144	0.056	-0.144	-0.056	0.0	0.0	99.9	99.9	0.00	0.00
R190	A	0.288	0.118	-0.288	-0.118	0.0	0.0	100.0	100.0	0.01	0.00
	B	0.280	0.131	-0.280	-0.131	0.0	0.0	100.0	100.0	0.01	0.00
	C	0.273	0.118	-0.273	-0.117	0.0	0.0	100.0	100.0	0.01	0.00
R380	A	0.077	0.030	-0.077	-0.030	0.0	0.0	99.9	99.9	0.01	0.00
	B	0.072	0.033	-0.072	-0.033	0.0	0.0	99.9	99.9	0.01	0.00
	C	0.073	0.027	-0.073	-0.027	0.0	0.0	99.9	99.9	0.01	0.00
R410	A	0.004	0.002	-0.004	-0.002	0.0	0.0	99.9	99.9	0.00	0.00
	B	0.005	0.002	-0.005	-0.002	0.0	0.0	99.9	99.9	0.00	0.00
	C	0.005	0.003	-0.005	-0.003	0.0	0.0	99.9	99.9	0.00	0.00
R436	A	0.288	0.118	-0.288	-0.118	0.1	0.0	100.0	100.0	0.02	0.00
	B	0.280	0.131	-0.279	-0.131	0.1	0.0	100.0	99.9	0.02	0.00
	C	0.273	0.117	-0.273	-0.117	0.1	0.0	100.0	100.0	0.02	0.00
R455	A	0.008	0.006	-0.008	-0.006	0.0	0.0	99.9	99.9	0.00	0.00
	B	0.007	0.004	-0.007	-0.004	0.0	0.0	99.9	99.9	0.00	0.00
	C	0.009	0.004	-0.009	-0.004	0.0	0.0	100.0	100.0	0.00	0.00
R560	A	0.000	0.000	0.000	0.000	0.0	0.0	99.8	99.8	0.00	0.00
	B	0.000	0.000	0.000	0.000	0.0	0.0	99.8	99.8	0.00	0.00
	C	0.000	0.000	0.000	0.000	0.0	0.0	99.8	99.8	0.00	0.00
R734	A	0.155	0.055	-0.155	-0.055	0.0	0.0	99.9	99.9	0.02	0.00
	B	0.151	0.065	-0.151	-0.065	0.0	0.0	99.9	99.9	0.02	0.00
	C	0.144	0.056	-0.144	-0.056	0.0	0.0	99.9	99.9	0.02	0.00
R803	A	0.025	0.008	-0.025	-0.008	0.0	0.0	99.8	99.8	0.00	0.00
	B	0.024	0.009	-0.024	-0.009	0.0	0.0	99.8	99.8	0.00	0.00
	C	0.024	0.007	-0.024	-0.007	0.0	0.0	99.8	99.8	0.00	0.00

Project:  
Location:  
Contract:  
Engineer:  
Filename: unbalance

ETAP  
12.6.0H  
  
Study Case: ULF

Page: 86  
Date: 05-03-2017  
SN:  
Revision: Base  
Config.: Normal

CKT / Branch		From-To Bus Flow		To-From Bus Flow		Losses		% Bus Voltage		Vd % Drop in Vmag	Amperes in Buried Winding
ID	Phase	MW	Mvar	MW	Mvar	kW	kvar	From	To		
R844	A	0.006	0.002	-0.006	-0.002	0.0	0.0	99.9	99.9	0.00	0.00
	B	0.006	0.003	-0.006	-0.003	0.0	0.0	99.9	99.9	0.00	0.00
	C	0.005	0.002	-0.005	-0.002	0.0	0.0	99.9	99.9	0.00	0.00
R950	A	0.023	0.007	-0.023	-0.007	0.0	0.0	99.9	99.9	0.00	0.00
	B	0.024	0.007	-0.024	-0.007	0.0	0.0	99.9	99.9	0.00	0.00
	C	0.023	0.008	-0.023	-0.008	0.0	0.0	99.9	99.9	0.00	0.00
R1435	A	0.030	0.010	-0.030	-0.010	0.0	0.0	99.9	99.9	0.00	0.00
	B	0.024	0.016	-0.024	-0.016	0.0	0.0	99.9	99.9	0.00	0.00
	C	0.022	0.007	-0.022	-0.007	0.0	0.0	99.9	99.9	0.00	0.00
R1499	A	0.004	0.002	-0.004	-0.002	0.0	0.0	99.9	99.9	0.00	0.00
	B	0.005	0.002	-0.005	-0.002	0.0	0.0	99.9	99.9	0.00	0.00
	C	0.005	0.003	-0.005	-0.003	0.0	0.0	99.9	99.9	0.00	0.00
T1 Al-masjid Al_kaber	A	0.030	0.014	-0.031	-0.016	-0.7	-1.7	99.9	99.5	0.45	0.00
	B	0.026	0.016	-0.024	-0.010	1.7	6.2	99.9	99.6	0.28	0.00
	C	0.026	0.011	-0.027	-0.012	-0.2	-0.8	99.9	99.6	0.35	0.00
T2 Mothalath Al_borg	A	0.030	0.014	-0.031	-0.016	-0.7	-1.7	100.0	99.5	0.45	0.00
	B	0.026	0.016	-0.024	-0.010	1.7	6.2	99.9	99.7	0.28	0.00
	C	0.026	0.011	-0.027	-0.012	-0.2	-0.8	100.0	99.6	0.35	0.00
T3 Maskaneh	A	0.030	0.014	-0.031	-0.016	-0.7	-1.7	99.9	99.4	0.45	0.00
	B	0.026	0.016	-0.024	-0.010	1.7	6.2	99.9	99.6	0.28	0.00
	C	0.026	0.011	-0.027	-0.012	-0.2	-0.8	99.9	99.6	0.35	0.00
T4 Bear mtawi'	A	0.019	0.012	-0.017	-0.008	1.4	3.3	100.0	99.7	0.26	0.00
	B	0.018	0.009	-0.017	-0.008	0.2	1.4	99.9	99.7	0.23	0.00
	C	0.020	0.009	-0.021	-0.011	-0.7	-1.4	100.0	99.7	0.30	0.00
T5 Wad algamary 1	A	0.032	0.014	-0.034	-0.014	-1.8	0.3	99.9	99.2	0.75	0.00
	B	0.033	0.016	-0.032	-0.014	1.3	1.8	99.9	99.2	0.71	0.00
	C	0.032	0.016	-0.030	-0.015	1.3	1.0	100.0	99.2	0.73	0.00
T6 Wad algamary 2	A	0.008	0.006	-0.007	-0.004	1.0	1.6	99.9	99.6	0.35	0.00
	B	0.007	0.004	-0.007	-0.003	0.0	0.9	99.9	99.6	0.30	0.00
	C	0.009	0.004	-0.009	-0.005	-0.6	-1.1	100.0	99.5	0.43	0.00
T7 Al_deir 1	A	0.039	0.014	-0.038	-0.011	1.0	2.5	99.9	99.2	0.70	0.00
	B	0.038	0.013	-0.038	-0.011	0.6	1.3	99.9	99.2	0.68	0.00
	C	0.040	0.012	-0.040	-0.013	-0.7	-0.2	99.9	99.2	0.75	0.00
T8 Karam al_ashqar	A	0.015	0.005	-0.019	-0.002	-3.5	3.2	99.9	99.7	0.23	0.00
	B	0.023	0.004	-0.023	-0.008	0.0	-3.6	99.9	99.4	0.44	0.00
	C	0.019	0.011	-0.015	-0.009	4.2	2.8	99.9	99.5	0.40	0.00
T9 Abu al_humas	A	0.039	0.014	-0.038	-0.011	1.0	2.5	99.9	99.2	0.70	0.00
	B	0.038	0.013	-0.038	-0.011	0.6	1.3	99.9	99.2	0.68	0.00
	C	0.040	0.012	-0.040	-0.013	-0.7	-0.2	99.9	99.1	0.75	0.00
T10 Meqtaa' duma	A	0.026	0.010	-0.028	-0.008	-1.7	2.4	99.8	99.3	0.50	0.00
	B	0.031	0.010	-0.031	-0.013	0.2	-2.4	99.8	99.2	0.67	0.00
	C	0.029	0.014	-0.026	-0.012	2.2	2.8	99.8	99.2	0.60	0.00
T11 Wad ali	A	0.034	0.011	-0.032	-0.012	2.2	-1.3	99.9	99.2	0.67	0.00
	B	0.029	0.012	-0.028	-0.009	1.3	3.7	99.9	99.4	0.51	0.00
	C	0.030	0.007	-0.033	-0.007	-2.7	0.5	99.9	99.4	0.49	0.00

Project:  
Location:  
Contract:  
Engineer:  
Filename: unbalance

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

Page: 87  
Date: 05-03-2017  
SN:  
Revision: Base  
Config.: Normal

CKT / Branch		From-To Bus Flow		To-From Bus Flow		Losses		% Bus Voltage		Vd % Drop in Vmag	Amperes in Buried Winding
ID	Phase	MW	Mvar	MW	Mvar	kW	kvar	From	To		
T12 Aqabit ghararah	A	0.027	0.009	-0.029	-0.007	-1.6	1.6	99.8	99.2	0.60	0.00
	B	0.030	0.010	-0.029	-0.011	1.4	-1.3	99.8	99.1	0.71	0.00
	C	0.028	0.012	-0.027	-0.010	1.1	2.4	99.8	99.2	0.63	0.00
T13 Qata't al_jamal	A	0.017	0.005	-0.020	-0.008	-3.2	-3.8	99.9	99.4	0.46	0.00
	B	0.017	0.009	-0.015	-0.006	1.9	3.7	99.9	99.5	0.31	0.00
	C	0.013	0.007	-0.011	-0.005	1.9	2.3	99.9	99.6	0.25	0.00
T14 Al_markaz	A	0.023	0.007	-0.023	-0.009	0.0	-1.5	99.9	99.4	0.48	0.00
	B	0.024	0.007	-0.026	-0.007	-1.9	1.0	99.9	99.4	0.43	0.00
	C	0.023	0.008	-0.020	-0.005	2.6	3.1	99.9	99.5	0.34	0.00
T15 Abu hashim	A	0.039	0.017	-0.039	-0.017	0.1	0.1	99.9	99.0	0.89	0.00
	B	0.038	0.019	-0.037	-0.017	1.4	1.6	99.9	99.0	0.87	0.00
	C	0.037	0.017	-0.038	-0.015	-0.6	2.0	99.9	99.1	0.81	0.00
T16 Sa'ada	A	0.019	0.005	-0.021	-0.006	-2.1	-0.9	99.8	99.5	0.38	0.00
	B	0.020	0.007	-0.019	-0.004	1.1	2.3	99.8	99.5	0.30	0.00
	C	0.018	0.006	-0.016	-0.005	1.7	0.9	99.8	99.5	0.31	0.00
T17 Al_baladiya	A	0.019	0.005	-0.021	-0.006	-2.1	-0.9	99.9	99.6	0.38	0.00
	B	0.020	0.007	-0.019	-0.004	1.1	2.3	99.9	99.6	0.29	0.00
	C	0.018	0.006	-0.016	-0.005	1.7	0.9	99.9	99.6	0.31	0.00
T18 Al_sheehk	A	0.039	0.018	-0.040	-0.018	-1.0	0.3	99.9	99.0	0.93	0.00
	B	0.037	0.019	-0.036	-0.014	1.5	4.4	99.9	99.1	0.76	0.00
	C	0.038	0.016	-0.038	-0.018	0.4	-1.0	99.9	99.0	0.88	0.00
T19 Kerbit alama	A	0.012	0.004	-0.010	-0.003	1.5	1.0	99.8	99.5	0.36	0.00
	B	0.011	0.002	-0.012	-0.002	-1.0	0.3	99.8	99.5	0.35	0.00
	C	0.013	0.003	-0.013	-0.002	0.0	0.1	99.8	99.4	0.37	0.00
T20 Aqabit al_tarsha	A	0.025	0.008	-0.024	-0.008	1.6	-0.1	100.0	99.1	0.90	0.00
	B	0.024	0.009	-0.023	-0.008	0.6	0.6	100.0	99.1	0.89	0.00
	C	0.024	0.007	-0.025	-0.006	-1.4	1.6	100.0	99.2	0.79	0.00
T21 Al_mustashfah	A	0.017	0.004	-0.020	-0.008	-3.2	-4.0	99.8	99.0	0.85	0.00
	B	0.017	0.009	-0.015	-0.006	1.9	3.5	99.8	99.2	0.58	0.00
	C	0.013	0.007	-0.011	-0.005	1.8	2.1	99.8	99.4	0.46	0.00
T22 Da'na	A	0.007	0.005	-0.008	-0.004	-0.6	0.6	99.8	99.5	0.38	0.00
	B	0.008	0.005	-0.008	-0.005	0.0	0.0	99.8	99.4	0.40	0.00
	C	0.008	0.006	-0.007	-0.005	0.9	0.7	99.8	99.5	0.38	0.00
T23 Kurza	A	0.025	0.008	-0.024	-0.008	1.6	-0.1	99.8	98.9	0.90	0.00
	B	0.024	0.009	-0.023	-0.008	0.6	0.6	99.8	98.9	0.89	0.00
	C	0.024	0.007	-0.025	-0.006	-1.4	1.6	99.8	99.0	0.79	0.00
T24 Al-deire 2	A	0.007	0.005	-0.008	-0.004	-0.6	0.6	99.9	99.6	0.38	0.00
	B	0.008	0.005	-0.008	-0.005	0.0	0.0	99.9	99.5	0.40	0.00
	C	0.008	0.006	-0.007	-0.005	0.9	0.7	99.9	99.5	0.39	0.00
T25 Rasmi wahab	A	0.007	0.005	-0.008	-0.004	-0.6	0.6	100.0	99.6	0.38	0.00
	B	0.008	0.005	-0.008	-0.005	0.0	0.0	100.0	99.6	0.40	0.00
	C	0.008	0.006	-0.007	-0.005	0.9	0.7	100.0	99.6	0.39	0.00
T26 Baten alqar'	A	0.018	0.010	-0.019	-0.009	-0.8	1.1	99.9	99.1	0.84	0.00
	B	0.020	0.010	-0.020	-0.011	0.3	-0.5	99.9	99.0	0.92	0.00
	C	0.019	0.012	-0.018	-0.010	1.1	1.3	99.9	99.1	0.88	0.00

Project:  
Location:  
Contract:  
Engineer:  
Filename: unbalance

ETAP  
12.6.0H  
  
Study Case: ULF

Page: 88  
Date: 05-03-2017  
SN:  
Revision: Base  
Config.: Normal

CKT / Branch		From-To Bus Flow		To-From Bus Flow		Losses		% Bus Voltage		Vd % Drop in Vmag	Amperes in Buried Winding
ID	Phase	MW	Mvar	MW	Mvar	kW	kvar	From	To		
T27 A1_muntazah	A	0.008	0.005	-0.007	-0.004	0.8	1.4	99.9	99.6	0.36	0.00
	B	0.007	0.004	-0.007	-0.003	0.0	0.9	99.9	99.6	0.29	0.00
	C	0.008	0.004	-0.009	-0.005	-0.4	-0.9	99.9	99.5	0.41	0.00
T28 Domet al_wridat	A	0.024	0.008	-0.022	-0.007	2.2	1.3	99.8	99.0	0.82	0.00
	B	0.021	0.008	-0.020	-0.008	1.1	0.9	99.8	99.0	0.78	0.00
	C	0.023	0.006	-0.025	-0.006	-2.6	-0.2	99.8	99.0	0.83	0.00
T29 Juret al_dama	A	0.022	0.012	-0.022	-0.011	0.0	0.9	99.9	98.9	1.01	0.00
	B	0.026	0.011	-0.027	-0.012	-1.6	-1.4	99.9	98.7	1.16	0.00
	C	0.025	0.014	-0.022	-0.011	2.4	2.8	99.9	98.9	1.01	0.00
T30 Kafar joul	A	0.020	0.006	-0.018	-0.009	1.4	-3.0	99.9	99.1	0.83	0.00
	B	0.015	0.010	-0.012	-0.007	2.7	3.4	99.9	99.3	0.58	0.00
	C	0.013	0.004	-0.017	-0.002	-3.6	1.3	99.9	99.4	0.47	0.00
T31 Sam'a	A	0.004	0.003	-0.004	-0.002	0.3	1.3	99.9	99.7	0.18	0.00
	B	0.005	0.002	-0.005	-0.001	-0.7	0.2	99.9	99.7	0.17	0.00
	C	0.006	0.003	-0.005	-0.003	0.7	-0.2	99.9	99.7	0.24	0.00
T32 Khalet al_ayaseh	A	0.006	0.003	-0.007	-0.002	-0.6	0.6	99.8	99.6	0.27	0.00
	B	0.009	0.002	-0.011	-0.002	-1.9	-0.8	99.8	99.5	0.34	0.00
	C	0.009	0.005	-0.006	-0.003	2.9	1.5	99.8	99.6	0.28	0.00
T33 A1_mizrab	A	0.006	0.002	-0.006	-0.002	-0.1	-0.1	99.9	99.7	0.23	0.00
	B	0.006	0.003	-0.005	-0.002	0.6	0.5	99.9	99.7	0.21	0.00
	C	0.005	0.002	-0.005	-0.001	-0.2	0.8	99.9	99.8	0.17	0.00
T34 A1_shadaqa	A	0.006	0.002	-0.006	-0.002	-0.1	-0.1	99.9	99.7	0.23	0.00
	B	0.006	0.003	-0.005	-0.002	0.6	0.5	99.9	99.7	0.21	0.00
	C	0.005	0.002	-0.005	-0.001	-0.2	0.8	99.9	99.8	0.17	0.00
T35 A1_shuqfan	A	0.014	0.005	-0.014	-0.004	0.0	0.3	99.9	99.0	0.93	0.00
	B	0.014	0.005	-0.013	-0.005	0.3	0.3	99.9	99.0	0.93	0.00
	C	0.013	0.005	-0.013	-0.004	0.1	0.6	99.9	99.0	0.90	0.00
T36 A1_estad	A	0.006	0.002	-0.006	-0.002	-0.1	-0.1	99.9	99.7	0.23	0.00
	B	0.006	0.003	-0.005	-0.002	0.6	0.5	99.9	99.7	0.21	0.00
	C	0.005	0.002	-0.005	-0.001	-0.2	0.8	99.9	99.7	0.17	0.00
T37 Eshreetch	A	0.019	0.006	-0.018	-0.005	0.7	1.5	99.9	99.3	0.61	0.00
	B	0.016	0.005	-0.014	-0.002	1.6	2.8	99.8	99.4	0.41	0.00
	C	0.018	0.003	-0.020	-0.006	-1.8	-2.6	99.9	99.2	0.68	0.00
T38 A1_muhtasib	A	0.013	0.007	-0.010	-0.004	2.9	2.6	99.8	99.4	0.41	0.00
	B	0.011	0.003	-0.013	-0.004	-1.6	-0.2	99.8	99.4	0.44	0.00
	C	0.015	0.004	-0.016	-0.005	-0.9	-0.9	99.8	99.3	0.55	0.00
T39 Jammoq	A	0.019	0.005	-0.018	-0.006	0.3	-0.9	99.9	99.2	0.67	0.00
	B	0.018	0.005	-0.019	-0.004	-0.5	1.1	99.8	99.2	0.60	0.00
	C	0.018	0.005	-0.017	-0.003	0.8	1.6	99.9	99.4	0.52	0.00
T40 A1_helal	A	0.003	0.001	-0.003	-0.001	0.3	-0.1	99.9	99.8	0.13	0.00
	B	0.002	0.002	-0.002	-0.001	0.4	0.8	99.9	99.8	0.08	0.00
	C	0.002	0.001	-0.002	0.000	-0.4	0.5	99.9	99.9	0.06	0.00
T41 A1_muntazah 2	A	0.012	0.004	-0.012	-0.005	-0.1	-0.3	99.9	99.4	0.49	0.00
	B	0.009	0.006	-0.007	-0.003	2.0	2.6	99.9	99.6	0.30	0.00
	C	0.010	0.003	-0.011	-0.004	-1.6	-0.9	99.9	99.5	0.40	0.00



Project:  
Location:  
Contract:  
Engineer:  
Filename: unbalance

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

Page: 89  
Date: 05-03-2017  
SN:  
Revision: Base  
Config.: Normal

CKT / Branch		From-To Bus Flow		To-From Bus Flow		Losses		% Bus Voltage		Vd % Drop in Vmag	Amperes in Buried Winding
ID	Phase	MW	Mvar	MW	Mvar	kW	kvar	From	To		
T42 Abu njeem 2	A	0.011	0.003	-0.012	-0.004	-0.7	-1.0	99.9	99.5	0.44	0.00
	B	0.011	0.006	-0.009	-0.005	1.8	0.5	99.9	99.5	0.44	0.00
	C	0.009	0.004	-0.009	-0.002	-0.8	1.9	100.0	99.7	0.30	0.00
T43 Al jame'a	A	0.009	0.007	-0.006	-0.003	2.9	4.1	99.8	99.6	0.28	0.00
	B	0.010	0.002	-0.012	-0.005	-2.0	-2.1	99.8	99.3	0.47	0.00
	C	0.013	0.005	-0.014	-0.006	-0.5	-0.5	99.8	99.3	0.55	0.00
T44 Alghwla	A	0.005	0.002	-0.005	-0.002	-0.4	0.3	99.9	99.7	0.20	0.00
	B	0.004	0.002	-0.002	-0.001	1.2	1.5	99.9	99.8	0.09	0.00
	C	0.004	0.001	-0.004	-0.002	-0.5	-0.5	99.9	99.7	0.18	0.00
T45 Masafi	A	0.017	0.005	-0.019	-0.007	-1.7	-1.2	99.9	99.1	0.72	0.00
	B	0.015	0.008	-0.013	-0.004	2.5	3.6	99.8	99.4	0.46	0.00
	C	0.014	0.005	-0.015	-0.006	-0.3	-0.8	99.9	99.3	0.57	0.00
T46 Al_jebreni	A	0.021	0.012	-0.019	-0.010	1.4	2.0	99.8	98.9	0.92	0.00
	B	0.022	0.011	-0.024	-0.012	-1.5	-1.6	99.8	98.7	1.09	0.00
	C	0.023	0.013	-0.022	-0.011	0.8	1.7	99.8	98.8	1.01	0.00
T47 Abu_njeem 1	A	0.006	0.002	-0.006	-0.002	0.2	-0.1	100.0	99.5	0.44	0.00
	B	0.005	0.003	-0.005	-0.002	0.4	1.0	99.9	99.6	0.32	0.00
	C	0.005	0.002	-0.006	-0.002	-0.3	0.0	100.0	99.6	0.37	0.00
T48 Inab al_kabeer	A	0.004	0.002	-0.004	-0.001	-0.2	0.7	99.9	99.6	0.29	0.00
	B	0.005	0.002	-0.006	-0.002	-0.5	-0.9	99.9	99.5	0.44	0.00
	C	0.005	0.003	-0.004	-0.002	0.8	0.9	99.9	99.6	0.34	0.00
T49 Shweki	A	0.004	0.002	-0.004	-0.001	-0.2	0.7	99.9	99.6	0.29	0.00
	B	0.005	0.002	-0.006	-0.002	-0.5	-0.9	99.9	99.5	0.44	0.00
	C	0.005	0.003	-0.004	-0.002	0.8	0.9	99.9	99.6	0.34	0.00
T50 Al-baha	A	0.019	0.005	-0.018	-0.006	0.4	-1.0	99.9	98.7	1.25	0.00
	B	0.018	0.005	-0.019	-0.004	-0.6	1.1	99.9	98.7	1.15	0.00
	C	0.018	0.005	-0.017	-0.003	0.9	1.5	99.9	98.9	1.01	0.00
T51 Inab al_sagher	A	0.019	0.006	-0.020	-0.005	-0.4	0.5	99.9	98.7	1.26	0.00
	B	0.018	0.008	-0.015	-0.007	2.6	1.1	99.9	98.8	1.15	0.00
	C	0.017	0.006	-0.019	-0.006	-1.5	0.0	99.9	98.7	1.24	0.00
T52 Bank al_eskan	A	0.006	0.002	-0.006	-0.002	0.2	-0.1	99.9	99.5	0.44	0.00
	B	0.005	0.003	-0.005	-0.002	0.4	1.0	99.9	99.6	0.32	0.00
	C	0.005	0.002	-0.006	-0.002	-0.3	0.0	99.9	99.5	0.37	0.00
T53 Al_tork	A	0.020	0.025	-0.022	-0.022	-2.0	3.2	99.8	99.3	0.55	0.00
	B	0.026	0.024	-0.026	-0.026	-0.4	-2.2	99.8	99.2	0.64	0.00
	C	0.024	0.029	-0.020	-0.026	3.3	2.8	99.8	99.2	0.62	0.00
T54 Wad algamary 3	A	0.006	0.002	-0.006	-0.002	0.2	-0.1	100.0	99.5	0.44	0.00
	B	0.005	0.003	-0.005	-0.002	0.4	1.0	99.9	99.6	0.32	0.00
	C	0.005	0.002	-0.006	-0.002	-0.3	0.0	100.0	99.6	0.37	0.00
T55 Mana'	A	0.006	0.005	-0.006	-0.005	-0.2	-0.2	99.9	99.5	0.38	0.00
	B	0.005	0.005	-0.004	-0.003	0.7	1.7	99.8	99.6	0.26	0.00
	C	0.005	0.004	-0.005	-0.004	-0.2	-0.2	99.9	99.6	0.31	0.00
						33.0	110.7				

Project:

**ETAP**

Page: 90

Location:

**12.6.0H**

Date: 05-03-2017

Contract:

SN:

Engineer:

Study Case: ULF

Revision: Base

Filename: unbalance

Config.: Normal

---

---

For branches below center-tap transformers, Phases A, B, and C correspond to (1), (2), and (N) respectively.

Project:  
Location:  
Contract:  
Engineer:  
Filename: unbalance

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

Page: 91  
Date: 05-03-2017  
SN:  
Revision: Base  
Config.: Normal

---

### Alert-Basic Summary Report

#### **% Alert Settings**

<u>Loading</u>	<u>Critical</u>
Bus	100.0
Cable	100.0
Reactor	100.0
Line	100.0
Transformer	100.0
Panel	100.0
Generator	100.0
Inverter/Charger	100.0
<u>Bus Voltage</u>	
OverVoltage	105.0
UnderVoltage	95.0
<u>Generator Excitation</u>	
OverExcited (Q Max.)	100.0
UnderExcited (Q Min.)	100.0

### Alert-Advanced Summary Report

#### **% Alert Settings**

<u>Bus Voltage</u>	<u>Critical</u>
Line Voltage Unbalanced Rate (LVUR)	3.0
Voltage Unbalanced Factor (VUF) Neg. Seq.	3.0
Voltage Unbalanced Factor (VUF) Zero Seq.	3.0
<u>Branch Current</u>	
Line Current Unbalanced Rate (LIUR)	3.0
Current Unbalanced Factor (IUF) Neg. Seq.	3.0
Current Unbalanced Factor (IUF) Zero Seq.	3.0

Project:  
Location:  
Contract:  
Engineer:  
Filename: unbalance

ETAP  
12.6.0H  
  
Study Case: ULF

Page: 92  
Date: 05-03-2017  
SN:  
Revision: Base  
Config.: Normal

### Critical Report

Device ID	Type	Condition	Rating/Limit	Unit	Operating A	Operating B	Operating C	%Op. A	%Op. B	%Op. C
C.20	Cable	LIUR (Pos. Seq.)	4.209	Amp	0.163	0.038	0.125	3.9	0.9	3.0
C.20	Cable	IUF 2 (Neg. Seq.)	4.207	Amp	0.171	0.171	0.171	4.1	4.1	4.1
C56	Cable	LIUR (Pos. Seq.)	2.878	Amp	0.091	0.004	0.087	3.2	0.2	3.0
C56	Cable	IUF 2 (Neg. Seq.)	2.877	Amp	0.103	0.103	0.103	3.6	3.6	3.6
C59	Cable	LIUR (Pos. Seq.)	14.919	Amp	0.266	0.248	0.514	1.8	1.7	3.4
C59	Cable	IUF 2 (Neg. Seq.)	14.915	Amp	0.510	0.510	0.510	3.4	3.4	3.4
C100	Cable	IUF 2 (Neg. Seq.)	1.286	Amp	0.040	0.040	0.040	3.1	3.1	3.1
C107	Cable	LIUR (Pos. Seq.)	1.587	Amp	0.090	0.095	0.005	5.7	6.0	0.3
C107	Cable	IUF 2 (Neg. Seq.)	1.585	Amp	0.107	0.107	0.107	6.8	6.8	6.8
C117	Cable	LIUR (Pos. Seq.)	4.885	Amp	0.108	0.197	0.090	2.2	4.0	1.8
C117	Cable	IUF 2 (Neg. Seq.)	4.882	Amp	0.200	0.200	0.200	4.1	4.1	4.1
C193	Cable	LIUR (Pos. Seq.)	0.473	Amp	0.036	0.059	0.023	7.6	12.5	4.9
C203	Cable	LIUR (Pos. Seq.)	6.677	Amp	0.196	0.123	0.318	2.9	1.8	4.8
C203	Cable	IUF 2 (Neg. Seq.)	6.673	Amp	0.325	0.325	0.325	4.9	4.9	4.9
C280	Cable	LIUR (Pos. Seq.)	0.961	Amp	0.086	0.088	0.002	9.0	9.2	0.2
C319	Cable	LIUR (Pos. Seq.)	1.835	Amp	0.159	0.015	0.144	8.6	0.8	7.8
C319	Cable	IUF 2 (Neg. Seq.)	1.831	Amp	0.174	0.174	0.174	9.5	9.5	9.5
C322	Cable	LIUR (Pos. Seq.)	6.677	Amp	0.196	0.123	0.318	2.9	1.8	4.8
C322	Cable	IUF 2 (Neg. Seq.)	6.673	Amp	0.325	0.325	0.325	4.9	4.9	4.9
C330	Cable	LIUR (Pos. Seq.)	0.305	Amp	0.027	0.008	0.019	8.9	2.7	6.1
C352	Cable	LIUR (Pos. Seq.)	7.469	Amp	0.138	0.130	0.268	1.8	1.7	3.6
C352	Cable	IUF 2 (Neg. Seq.)	7.467	Amp	0.266	0.266	0.266	3.6	3.6	3.6
C399	Cable	LIUR (Pos. Seq.)	5.364	Amp	0.143	0.213	0.070	2.7	4.0	1.3
C399	Cable	IUF 2 (Neg. Seq.)	5.362	Amp	0.219	0.219	0.219	4.1	4.1	4.1
C419	Cable	LIUR (Pos. Seq.)	0.961	Amp	0.086	0.088	0.002	9.0	9.2	0.2
C440	Cable	LIUR (Pos. Seq.)	0.285	Amp	0.014	0.029	0.044	5.0	10.3	15.3
C450	Cable	LIUR (Pos. Seq.)	1.425	Amp	0.098	0.035	0.064	6.9	2.4	4.5
C450	Cable	IUF 2 (Neg. Seq.)	1.424	Amp	0.098	0.098	0.098	6.9	6.9	6.9
C.450	Cable	LIUR (Pos. Seq.)	1.320	Amp	0.054	0.016	0.070	4.1	1.2	5.3
C.450	Cable	IUF 2 (Neg. Seq.)	1.319	Amp	0.074	0.074	0.074	5.6	5.6	5.6
C461	Cable	LIUR (Pos. Seq.)	0.463	Amp	0.095	0.029	0.066	20.5	6.3	14.3
C462	Cable	LIUR (Pos. Seq.)	1.308	Amp	0.124	0.088	0.036	9.5	6.7	2.8
C462	Cable	IUF 2 (Neg. Seq.)	1.305	Amp	0.131	0.131	0.131	10.0	10.0	10.0
C463	Cable	LIUR (Pos. Seq.)	0.305	Amp	0.027	0.008	0.019	8.9	2.7	6.1
C476	Cable	LIUR (Pos. Seq.)	2.162	Amp	0.105	0.058	0.163	4.8	2.7	7.5
C476	Cable	IUF 2 (Neg. Seq.)	2.159	Amp	0.163	0.163	0.163	7.5	7.5	7.5
C514	Cable	LIUR (Pos. Seq.)	3.240	Amp	0.047	0.053	0.100	1.5	1.6	3.1
C514	Cable	IUF 2 (Neg. Seq.)	3.239	Amp	0.100	0.100	0.100	3.1	3.1	3.1
C517	Cable	LIUR (Pos. Seq.)	2.668	Amp	0.018	0.159	0.177	0.7	5.9	6.6
C517	Cable	IUF 2 (Neg. Seq.)	2.665	Amp	0.196	0.196	0.196	7.4	7.4	7.4
C518	Cable	LIUR (Pos. Seq.)	4.010	Amp	0.023	0.157	0.133	0.6	3.9	3.3
C518	Cable	IUF 2 (Neg. Seq.)	4.008	Amp	0.169	0.169	0.169	4.2	4.2	4.2

Project:  
Location:  
Contract:  
Engineer:  
Filename: unbalance

ETAP  
12.6.0H  
  
Study Case: ULF

Page: 93  
Date: 05-03-2017  
SN:  
Revision: Base  
Config.: Normal

### Critical Report

Device ID	Type	Condition	Rating/Limit	Unit	Operating A	Operating B	Operating C	%Op. A	%Op. B	%Op. C
C587	Cable	LIUR (Pos. Seq.)	1.261	Amp	0.078	0.053	0.025	6.2	4.2	2.0
C587	Cable	IUF 2 (Neg. Seq.)	1.260	Amp	0.081	0.081	0.081	6.4	6.4	6.4
C603	Cable	LIUR (Pos. Seq.)	13.625	Amp	0.460	0.167	0.293	3.4	1.2	2.1
C603	Cable	IUF 2 (Neg. Seq.)	13.621	Amp	0.462	0.462	0.462	3.4	3.4	3.4
C622	Cable	LIUR (Pos. Seq.)	0.481	Amp	0.034	0.014	0.020	7.1	2.9	4.1
C727	Cable	IUF 2 (Neg. Seq.)	1.277	Amp	0.040	0.040	0.040	3.1	3.1	3.1
C728	Cable	LIUR (Pos. Seq.)	2.215	Amp	0.145	0.027	0.172	6.6	1.2	7.8
C728	Cable	IUF 2 (Neg. Seq.)	2.211	Amp	0.184	0.184	0.184	8.3	8.3	8.3
C806	Cable	LIUR (Pos. Seq.)	6.714	Amp	0.141	0.121	0.261	2.1	1.8	3.9
C806	Cable	IUF 2 (Neg. Seq.)	6.711	Amp	0.259	0.259	0.259	3.9	3.9	3.9
C811	Cable	LIUR (Pos. Seq.)	2.003	Amp	0.133	0.080	0.053	6.6	4.0	2.6
C811	Cable	IUF 2 (Neg. Seq.)	2.001	Amp	0.136	0.136	0.136	6.8	6.8	6.8
C815	Cable	LIUR (Pos. Seq.)	2.036	Amp	0.024	0.117	0.141	1.2	5.8	6.9
C815	Cable	IUF 2 (Neg. Seq.)	2.033	Amp	0.152	0.152	0.152	7.5	7.5	7.5
C880	Cable	LIUR (Pos. Seq.)	1.320	Amp	0.054	0.016	0.070	4.1	1.2	5.3
C880	Cable	IUF 2 (Neg. Seq.)	1.319	Amp	0.074	0.074	0.074	5.6	5.6	5.6
Co57	Impedance	LIUR (Pos. Seq.)	1.835	Amp	0.159	0.015	0.144	8.6	0.8	7.8
Co57	Impedance	IUF 2 (Neg. Seq.)	1.831	Amp	0.174	0.174	0.174	9.5	9.5	9.5
Co58	Impedance	LIUR (Pos. Seq.)	1.767	Amp	0.092	0.020	0.072	5.2	1.1	4.1
Co58	Impedance	IUF 2 (Neg. Seq.)	1.765	Amp	0.098	0.098	0.098	5.5	5.5	5.5
Co130	Impedance	LIUR (Pos. Seq.)	11.682	Amp	0.219	0.194	0.413	1.9	1.7	3.5
Co130	Impedance	IUF 2 (Neg. Seq.)	11.678	Amp	0.410	0.410	0.410	3.5	3.5	3.5
Co261	Impedance	LIUR (Pos. Seq.)	0.537	Amp	0.041	0.016	0.057	7.6	3.0	10.6
Co294	Impedance	LIUR (Pos. Seq.)	1.324	Amp	0.064	0.044	0.020	4.8	3.3	1.5
Co294	Impedance	IUF 2 (Neg. Seq.)	1.324	Amp	0.066	0.066	0.066	5.0	5.0	5.0
Co528	Impedance	LIUR (Pos. Seq.)	0.229	Amp	0.032	0.002	0.029	13.8	1.0	12.9
Co600	Impedance	LIUR (Pos. Seq.)	11.682	Amp	0.219	0.194	0.413	1.9	1.7	3.5
Co600	Impedance	IUF 2 (Neg. Seq.)	11.678	Amp	0.410	0.410	0.410	3.5	3.5	3.5
Co645	Impedance	LIUR (Pos. Seq.)	0.537	Amp	0.041	0.016	0.057	7.6	3.0	10.6
Co999	Impedance	LIUR (Pos. Seq.)	1.633	Amp	0.071	0.024	0.048	4.4	1.4	2.9
Co999	Impedance	IUF 2 (Neg. Seq.)	1.632	Amp	0.073	0.073	0.073	4.5	4.5	4.5
D240	Impedance	LIUR (Pos. Seq.)	0.280	Amp	0.048	0.018	0.029	17.0	6.5	10.5
D256	Impedance	LIUR (Pos. Seq.)	0.280	Amp	0.048	0.018	0.029	17.0	6.5	10.5
D276	Impedance	LIUR (Pos. Seq.)	0.280	Amp	0.048	0.018	0.029	17.0	6.5	10.5
D634	Impedance	LIUR (Pos. Seq.)	0.865	Amp	0.038	0.004	0.042	4.4	0.4	4.9
D655	Impedance	LIUR (Pos. Seq.)	1.324	Amp	0.064	0.044	0.020	4.8	3.3	1.5
D655	Impedance	IUF 2 (Neg. Seq.)	1.324	Amp	0.066	0.066	0.066	5.0	5.0	5.0
D711	Impedance	LIUR (Pos. Seq.)	1.324	Amp	0.064	0.044	0.020	4.8	3.3	1.5
D711	Impedance	IUF 2 (Neg. Seq.)	1.324	Amp	0.066	0.066	0.066	5.0	5.0	5.0
D718	Impedance	LIUR (Pos. Seq.)	0.280	Amp	0.048	0.018	0.029	17.0	6.5	10.5
R10	Impedance	LIUR (Pos. Seq.)	0.229	Amp	0.032	0.002	0.029	13.8	1.0	12.9
R45	Impedance	LIUR (Pos. Seq.)	4.209	Amp	0.163	0.038	0.125	3.9	0.9	3.0

Project:  
Location:  
Contract:  
Engineer:  
Filename: unbalance

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

Page: 94  
Date: 05-03-2017  
SN:  
Revision: Base  
Config.: Normal

### Critical Report

Device ID	Type	Condition	Rating/Limit	Unit	Operating A	Operating B	Operating C	%Op. A	%Op. B	%Op. C
R45	Impedance	IUF 2 (Neg. Seq.)	4.207	Amp	0.171	0.171	0.171	4.1	4.1	4.1
R150	Impedance	LIUR (Pos. Seq.)	4.209	Amp	0.163	0.038	0.125	3.9	0.9	3.0
R150	Impedance	IUF 2 (Neg. Seq.)	4.207	Amp	0.171	0.171	0.171	4.1	4.1	4.1
R164	Impedance	LIUR (Pos. Seq.)	8.473	Amp	0.180	0.153	0.333	2.1	1.8	3.9
R164	Impedance	IUF 2 (Neg. Seq.)	8.470	Amp	0.330	0.330	0.330	3.9	3.9	3.9
R380	Impedance	LIUR (Pos. Seq.)	4.209	Amp	0.163	0.038	0.125	3.9	0.9	3.0
R380	Impedance	IUF 2 (Neg. Seq.)	4.207	Amp	0.171	0.171	0.171	4.1	4.1	4.1
R410	Impedance	LIUR (Pos. Seq.)	0.280	Amp	0.048	0.018	0.029	17.0	6.5	10.5
R455	Impedance	LIUR (Pos. Seq.)	0.473	Amp	0.036	0.059	0.023	7.6	12.5	4.9
R734	Impedance	LIUR (Pos. Seq.)	8.473	Amp	0.180	0.153	0.333	2.1	1.8	3.9
R734	Impedance	IUF 2 (Neg. Seq.)	8.470	Amp	0.330	0.330	0.330	3.9	3.9	3.9
R803	Impedance	LIUR (Pos. Seq.)	1.347	Amp	0.049	0.003	0.046	3.7	0.2	3.4
R803	Impedance	IUF 2 (Neg. Seq.)	1.346	Amp	0.055	0.055	0.055	4.1	4.1	4.1
R844	Impedance	LIUR (Pos. Seq.)	0.309	Amp	0.009	0.019	0.028	2.9	6.2	9.1
R950	Impedance	IUF 2 (Neg. Seq.)	1.277	Amp	0.040	0.040	0.040	3.1	3.1	3.1
R1435	Impedance	LIUR (Pos. Seq.)	1.455	Amp	0.202	0.042	0.244	13.9	2.9	16.8
R1435	Impedance	IUF 2 (Neg. Seq.)	1.444	Amp	0.258	0.258	0.258	17.8	17.8	17.8
R1499	Impedance	LIUR (Pos. Seq.)	0.280	Amp	0.048	0.018	0.029	17.0	6.5	10.5
T1 Al-masjid Al_kaber	2W XFMR	LIUR (Pos. Seq.)	129.966	Amp	19.899	17.128	2.772	15.3	13.2	2.1
T1 Al-masjid Al_kaber	2W XFMR	IUF 2 (Neg. Seq.)	129.862	Amp	11.137	11.137	11.137	8.6	8.6	8.6
T1 Al-masjid Al_kaber	2W XFMR	IUF 0 (Zero Seq.)	129.862	Amp	11.636	11.636	11.636	9.0	9.0	9.0
T2 Mothalath Al_borg	2W XFMR	LIUR (Pos. Seq.)	129.939	Amp	19.895	17.124	2.771	15.3	13.2	2.1
T2 Mothalath Al_borg	2W XFMR	IUF 2 (Neg. Seq.)	129.835	Amp	11.134	11.134	11.134	8.6	8.6	8.6
T2 Mothalath Al_borg	2W XFMR	IUF 0 (Zero Seq.)	129.835	Amp	11.633	11.633	11.633	9.0	9.0	9.0
T3 Maskaneh	2W XFMR	LIUR (Pos. Seq.)	129.985	Amp	19.902	17.130	2.772	15.3	13.2	2.1
T3 Maskaneh	2W XFMR	IUF 2 (Neg. Seq.)	129.881	Amp	11.138	11.138	11.138	8.6	8.6	8.6
T3 Maskaneh	2W XFMR	IUF 0 (Zero Seq.)	129.881	Amp	11.638	11.638	11.638	9.0	9.0	9.0
T4 Bear mtawi'	2W XFMR	LIUR (Pos. Seq.)	89.946	Amp	5.790	7.098	12.889	6.4	7.9	14.3
T4 Bear mtawi'	2W XFMR	IUF 2 (Neg. Seq.)	89.929	Amp	7.045	7.045	7.045	7.8	7.8	7.8
T4 Bear mtawi'	2W XFMR	IUF 0 (Zero Seq.)	89.929	Amp	6.061	6.061	6.061	6.7	6.7	6.7
T5 Wad algamary 1	2W XFMR	LIUR (Pos. Seq.)	153.440	Amp	7.559	1.604	5.955	4.9	1.0	3.9
T5 Wad algamary 1	2W XFMR	IUF 0 (Zero Seq.)	153.392	Amp	5.656	5.656	5.656	3.7	3.7	3.7
T6 Wad algamary 2	2W XFMR	LIUR (Pos. Seq.)	37.624	Amp	2.898	5.077	7.975	7.7	13.5	21.2
T6 Wad algamary 2	2W XFMR	IUF 2 (Neg. Seq.)	37.607	Amp	4.770	4.770	4.770	12.7	12.7	12.7
T6 Wad algamary 2	2W XFMR	IUF 0 (Zero Seq.)	37.607	Amp	3.341	3.341	3.341	8.9	8.9	8.9
T7 Al_deir 1	2W XFMR	LIUR (Pos. Seq.)	176.924	Amp	2.917	5.093	8.010	1.6	2.9	4.5
T8 Karam al_ashqar	2W XFMR	LIUR (Pos. Seq.)	87.166	Amp	6.208	18.009	11.801	7.1	20.7	13.5
T8 Karam al_ashqar	2W XFMR	IUF 2 (Neg. Seq.)	85.959	Amp	19.399	19.399	19.399	22.6	22.6	22.6
T9 Abu al_humas	2W XFMR	LIUR (Pos. Seq.)	176.992	Amp	2.918	5.095	8.013	1.6	2.9	4.5
T10 Meqtaa' duma	2W XFMR	LIUR (Pos. Seq.)	132.820	Amp	6.312	13.419	7.107	4.8	10.1	5.4
T10 Meqtaa' duma	2W XFMR	IUF 2 (Neg. Seq.)	132.552	Amp	12.455	12.455	12.455	9.4	9.4	9.4
T11 Wad ali	2W XFMR	LIUR (Pos. Seq.)	140.721	Amp	8.019	13.266	5.247	5.7	9.4	3.7

Project:  
Location:  
Contract:  
Engineer:  
Filename: unbalance

ETAP  
12.6.0H  
  
Study Case: ULF

Page: 95  
Date: 05-03-2017  
SN:  
Revision: Base  
Config.: Normal

Critical Report

Device ID	Type	Condition	Rating/Limit	Unit	Operating A	Operating B	Operating C	%Op. A	%Op. B	%Op. C
T11 Wad ali	2W XFMR	IUF 2 (Neg. Seq.)	140.429	Amp	13.093	13.093	13.093	9.3	9.3	9.3
T12 Aqabit gharrarah	2W XFMR	LIUR (Pos. Seq.)	129.396	Amp	0.192	6.447	6.255	0.1	5.0	4.8
T12 Aqabit gharrarah	2W XFMR	IUF 2 (Neg. Seq.)	129.183	Amp	8.853	8.853	8.853	6.9	6.9	6.9
T13 Qata't al_jamal	2W XFMR	LIUR (Pos. Seq.)	73.109	Amp	22.930	2.768	20.162	31.4	3.8	27.6
T13 Qata't al_jamal	2W XFMR	IUF 2 (Neg. Seq.)	73.093	Amp	11.509	11.509	11.509	15.7	15.7	15.7
T13 Qata't al_jamal	2W XFMR	IUF 0 (Zero Seq.)	73.093	Amp	13.533	13.533	13.533	18.5	18.5	18.5
T14 Al_markaz	2W XFMR	LIUR (Pos. Seq.)	104.698	Amp	1.340	11.741	13.081	1.3	11.2	12.5
T14 Al_markaz	2W XFMR	IUF 2 (Neg. Seq.)	104.555	Amp	3.285	3.285	3.285	3.1	3.1	3.1
T14 Al_markaz	2W XFMR	IUF 0 (Zero Seq.)	104.555	Amp	11.076	11.076	11.076	10.6	10.6	10.6
T16 Sa'ada	2W XFMR	LIUR (Pos. Seq.)	84.260	Amp	11.318	1.315	10.003	13.4	1.6	11.9
T16 Sa'ada	2W XFMR	IUF 2 (Neg. Seq.)	84.209	Amp	4.533	4.533	4.533	5.4	5.4	5.4
T16 Sa'ada	2W XFMR	IUF 0 (Zero Seq.)	84.209	Amp	8.042	8.042	8.042	9.6	9.6	9.6
T17 Al_baladiya	2W XFMR	LIUR (Pos. Seq.)	84.204	Amp	11.311	1.315	9.996	13.4	1.6	11.9
T17 Al_baladiya	2W XFMR	IUF 2 (Neg. Seq.)	84.153	Amp	4.530	4.530	4.530	5.4	5.4	5.4
T17 Al_baladiya	2W XFMR	IUF 0 (Zero Seq.)	84.153	Amp	8.037	8.037	8.037	9.6	9.6	9.6
T18 Al_sheehk	2W XFMR	LIUR (Pos. Seq.)	180.771	Amp	12.275	12.727	0.452	6.8	7.0	0.3
T18 Al_sheehk	2W XFMR	IUF 0 (Zero Seq.)	180.715	Amp	9.793	9.793	9.793	5.4	5.4	5.4
T19 Kerbit alama	2W XFMR	LIUR (Pos. Seq.)	52.278	Amp	5.794	1.592	4.202	11.1	3.0	8.0
T19 Kerbit alama	2W XFMR	IUF 2 (Neg. Seq.)	52.235	Amp	3.937	3.937	3.937	7.5	7.5	7.5
T19 Kerbit alama	2W XFMR	IUF 0 (Zero Seq.)	52.235	Amp	2.648	2.648	2.648	5.1	5.1	5.1
T20 Aqabit al_tarsha	2W XFMR	IUF 2 (Neg. Seq.)	109.972	Amp	4.569	4.569	4.569	4.2	4.2	4.2
T20 Aqabit al_tarsha	2W XFMR	IUF 0 (Zero Seq.)	109.972	Amp	4.091	4.091	4.091	3.7	3.7	3.7
T21 Al_mustashfah	2W XFMR	LIUR (Pos. Seq.)	73.262	Amp	23.024	2.788	20.235	31.4	3.8	27.6
T21 Al_mustashfah	2W XFMR	IUF 2 (Neg. Seq.)	73.246	Amp	11.555	11.555	11.555	15.8	15.8	15.8
T21 Al_mustashfah	2W XFMR	IUF 0 (Zero Seq.)	73.246	Amp	13.585	13.585	13.585	18.5	18.5	18.5
T22 Da'na	2W XFMR	LIUR (Pos. Seq.)	38.379	Amp	0.583	2.468	1.885	1.5	6.4	4.9
T22 Da'na	2W XFMR	IUF 2 (Neg. Seq.)	38.308	Amp	2.777	2.777	2.777	7.2	7.2	7.2
T23 Kurza	2W XFMR	IUF 2 (Neg. Seq.)	110.090	Amp	4.574	4.574	4.574	4.2	4.2	4.2
T23 Kurza	2W XFMR	IUF 0 (Zero Seq.)	110.090	Amp	4.097	4.097	4.097	3.7	3.7	3.7
T24 Al-deire 2	2W XFMR	LIUR (Pos. Seq.)	38.356	Amp	0.582	2.466	1.884	1.5	6.4	4.9
T24 Al-deire 2	2W XFMR	IUF 2 (Neg. Seq.)	38.285	Amp	2.776	2.776	2.776	7.2	7.2	7.2
T25 Rasmi wahab	2W XFMR	LIUR (Pos. Seq.)	38.342	Amp	0.582	2.465	1.883	1.5	6.4	4.9
T25 Rasmi wahab	2W XFMR	IUF 2 (Neg. Seq.)	38.271	Amp	2.775	2.775	2.775	7.2	7.2	7.2
T26 Baten alqar'	2W XFMR	LIUR (Pos. Seq.)	93.279	Amp	1.845	4.771	2.926	2.0	5.1	3.1
T26 Baten alqar'	2W XFMR	IUF 2 (Neg. Seq.)	93.214	Amp	4.872	4.872	4.872	5.2	5.2	5.2
T27 Al_muntazah	2W XFMR	LIUR (Pos. Seq.)	36.902	Amp	2.172	4.352	6.524	5.9	11.8	17.7
T27 Al_muntazah	2W XFMR	IUF 2 (Neg. Seq.)	36.884	Amp	4.050	4.050	4.050	11.0	11.0	11.0
T27 Al_muntazah	2W XFMR	IUF 0 (Zero Seq.)	36.884	Amp	2.639	2.639	2.639	7.2	7.2	7.2
T28 Domet al_wridat	2W XFMR	LIUR (Pos. Seq.)	103.093	Amp	2.468	8.574	11.043	2.4	8.3	10.7
T28 Domet al_wridat	2W XFMR	IUF 2 (Neg. Seq.)	102.987	Amp	6.699	6.699	6.699	6.5	6.5	6.5
T28 Domet al_wridat	2W XFMR	IUF 0 (Zero Seq.)	102.987	Amp	6.650	6.650	6.650	6.5	6.5	6.5
T29 Juret al_dama	2W XFMR	LIUR (Pos. Seq.)	116.296	Amp	7.312	14.624	7.312	6.3	12.6	6.3

Project:  
Location:  
Contract:  
Engineer:  
Filename: unbalance

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

Page: 96  
Date: 05-03-2017  
SN:  
Revision: Base  
Config.: Normal

### Critical Report

Device ID	Type	Condition	Rating/Limit	Unit	Operating A	Operating B	Operating C	%Op. A	%Op. B	%Op. C
T29 Juret al_dama	2W XFMR	IUF 2 (Neg. Seq.)	116.278	Amp	8.113	8.113	8.113	7.0	7.0	7.0
T29 Juret al_dama	2W XFMR	IUF 0 (Zero Seq.)	116.278	Amp	6.748	6.748	6.748	5.8	5.8	5.8
T30 Kafar joul	2W XFMR	LIUR (Pos. Seq.)	74.850	Amp	14.138	14.133	0.004	18.9	18.9	0.0
T30 Kafar joul	2W XFMR	IUF 2 (Neg. Seq.)	73.903	Amp	16.557	16.557	16.557	22.4	22.4	22.4
T31 Sam'a	2W XFMR	LIUR (Pos. Seq.)	22.368	Amp	3.944	1.629	2.315	17.6	7.3	10.4
T31 Sam'a	2W XFMR	IUF 2 (Neg. Seq.)	22.216	Amp	3.822	3.822	3.822	17.2	17.2	17.2
T32 Khalet al_ayaseh	2W XFMR	LIUR (Pos. Seq.)	37.057	Amp	4.929	12.463	7.533	13.3	33.6	20.3
T32 Khalet al_ayaseh	2W XFMR	IUF 2 (Neg. Seq.)	36.832	Amp	7.788	7.788	7.788	21.1	21.1	21.1
T32 Khalet al_ayaseh	2W XFMR	IUF 0 (Zero Seq.)	36.832	Amp	5.897	5.897	5.897	16.0	16.0	16.0
T33 Al_mizrab	2W XFMR	LIUR (Pos. Seq.)	24.471	Amp	2.236	0.773	1.463	9.1	3.2	6.0
T33 Al_mizrab	2W XFMR	IUF 2 (Neg. Seq.)	24.413	Amp	2.322	2.322	2.322	9.5	9.5	9.5
T34 Al_shadaqa	2W XFMR	LIUR (Pos. Seq.)	24.471	Amp	2.236	0.773	1.463	9.1	3.2	6.0
T34 Al_shadaqa	2W XFMR	IUF 2 (Neg. Seq.)	24.413	Amp	2.322	2.322	2.322	9.5	9.5	9.5
T36 Al_estad	2W XFMR	LIUR (Pos. Seq.)	24.477	Amp	2.236	0.773	1.463	9.1	3.2	6.0
T36 Al_estad	2W XFMR	IUF 2 (Neg. Seq.)	24.420	Amp	2.322	2.322	2.322	9.5	9.5	9.5
T37 Eshreeteh	2W XFMR	LIUR (Pos. Seq.)	78.283	Amp	3.927	15.718	11.791	5.0	20.1	15.1
T37 Eshreeteh	2W XFMR	IUF 2 (Neg. Seq.)	78.218	Amp	8.334	8.334	8.334	10.7	10.7	10.7
T37 Eshreeteh	2W XFMR	IUF 0 (Zero Seq.)	78.218	Amp	8.639	8.639	8.639	11.0	11.0	11.0
T38 Al_muhtasib	2W XFMR	LIUR (Pos. Seq.)	58.404	Amp	12.773	0.155	12.928	21.9	0.3	22.1
T38 Al_muhtasib	2W XFMR	IUF 2 (Neg. Seq.)	58.335	Amp	8.811	8.811	8.811	15.1	15.1	15.1
T38 Al_muhtasib	2W XFMR	IUF 0 (Zero Seq.)	58.335	Amp	6.366	6.366	6.366	10.9	10.9	10.9
T39 Jammoq	2W XFMR	LIUR (Pos. Seq.)	81.917	Amp	2.064	3.342	5.407	2.5	4.1	6.6
T39 Jammoq	2W XFMR	IUF 0 (Zero Seq.)	81.832	Amp	5.088	5.088	5.088	6.2	6.2	6.2
T40 Al_helal	2W XFMR	LIUR (Pos. Seq.)	10.053	Amp	1.837	1.934	0.096	18.3	19.2	1.0
T40 Al_helal	2W XFMR	IUF 2 (Neg. Seq.)	9.931	Amp	2.194	2.194	2.194	22.1	22.1	22.1
T41 Al_muntazah 2	2W XFMR	LIUR (Pos. Seq.)	47.335	Amp	9.146	12.615	3.469	19.3	26.6	7.3
T41 Al_muntazah 2	2W XFMR	IUF 2 (Neg. Seq.)	47.313	Amp	7.449	7.449	7.449	15.7	15.7	15.7
T41 Al_muntazah 2	2W XFMR	IUF 0 (Zero Seq.)	47.313	Amp	5.614	5.614	5.614	11.9	11.9	11.9
T42 Abu njeem 2	2W XFMR	LIUR (Pos. Seq.)	47.613	Amp	6.814	1.291	5.523	14.3	2.7	11.6
T42 Abu njeem 2	2W XFMR	IUF 2 (Neg. Seq.)	47.308	Amp	7.432	7.432	7.432	15.7	15.7	15.7
T43 Al_jame'a	2W XFMR	LIUR (Pos. Seq.)	50.279	Amp	19.887	5.366	14.521	39.6	10.7	28.9
T43 Al_jame'a	2W XFMR	IUF 2 (Neg. Seq.)	50.278	Amp	10.581	10.581	10.581	21.0	21.0	21.0
T43 Al_jame'a	2W XFMR	IUF 0 (Zero Seq.)	50.278	Amp	9.996	9.996	9.996	19.9	19.9	19.9
T44 Alghwla	2W XFMR	LIUR (Pos. Seq.)	17.639	Amp	4.920	6.799	1.879	27.9	38.5	10.7
T44 Alghwla	2W XFMR	IUF 2 (Neg. Seq.)	17.620	Amp	2.959	2.959	2.959	16.8	16.8	16.8
T44 Alghwla	2W XFMR	IUF 0 (Zero Seq.)	17.620	Amp	4.070	4.070	4.070	23.1	23.1	23.1
T45 Masafi	2W XFMR	LIUR (Pos. Seq.)	71.192	Amp	16.302	12.951	3.351	22.9	18.2	4.7
T45 Masafi	2W XFMR	IUF 2 (Neg. Seq.)	71.174	Amp	7.595	7.595	7.595	10.7	10.7	10.7
T45 Masafi	2W XFMR	IUF 0 (Zero Seq.)	71.174	Amp	9.648	9.648	9.648	13.6	13.6	13.6
T46 Al_jebreni	2W XFMR	LIUR (Pos. Seq.)	107.597	Amp	11.691	10.244	1.447	10.9	9.5	1.3
T46 Al_jebreni	2W XFMR	IUF 2 (Neg. Seq.)	107.593	Amp	6.133	6.133	6.133	5.7	5.7	5.7
T46 Al_jebreni	2W XFMR	IUF 0 (Zero Seq.)	107.593	Amp	6.678	6.678	6.678	6.2	6.2	6.2



Project:  
Location:  
Contract:  
Engineer:  
Filename: unbalance

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

Page: 97  
Date: 05-03-2017  
SN:  
Revision: Base  
Config.: Normal

### Critical Report

Device ID	Type	Condition	Rating/Limit	Unit	Operating A	Operating B	Operating C	%Op. A	%Op. B	%Op. C
T47 Abu_njeem 1	2W XFMR	LIUR (Pos. Seq.)	24.456	Amp	2.469	3.190	0.721	10.1	13.0	2.9
T47 Abu_njeem 1	2W XFMR	IUF 2 (Neg. Seq.)	24.436	Amp	2.328	2.328	2.328	9.5	9.5	9.5
T47 Abu_njeem 1	2W XFMR	IUF 0 (Zero Seq.)	24.436	Amp	1.074	1.074	1.074	4.4	4.4	4.4
T48 Inab_al_kabeer	2W XFMR	LIUR (Pos. Seq.)	22.287	Amp	3.627	5.513	1.886	16.3	24.7	8.5
T48 Inab_al_kabeer	2W XFMR	IUF 2 (Neg. Seq.)	22.233	Amp	3.829	3.829	3.829	17.2	17.2	17.2
T48 Inab_al_kabeer	2W XFMR	IUF 0 (Zero Seq.)	22.233	Amp	1.857	1.857	1.857	8.4	8.4	8.4
T49 Shweki	2W XFMR	LIUR (Pos. Seq.)	22.289	Amp	3.628	5.514	1.886	16.3	24.7	8.5
T49 Shweki	2W XFMR	IUF 2 (Neg. Seq.)	22.235	Amp	3.830	3.830	3.830	17.2	17.2	17.2
T49 Shweki	2W XFMR	IUF 0 (Zero Seq.)	22.235	Amp	1.857	1.857	1.857	8.4	8.4	8.4
T50 Al-baha	2W XFMR	LIUR (Pos. Seq.)	82.162	Amp	2.088	3.358	5.445	2.5	4.1	6.6
T50 Al-baha	2W XFMR	IUF 0 (Zero Seq.)	82.073	Amp	5.240	5.240	5.240	6.4	6.4	6.4
T51 Inab_al_sagher	2W XFMR	LIUR (Pos. Seq.)	82.348	Amp	6.278	9.047	2.770	7.6	11.0	3.4
T51 Inab_al_sagher	2W XFMR	IUF 2 (Neg. Seq.)	82.221	Amp	5.343	5.343	5.343	6.5	6.5	6.5
T51 Inab_al_sagher	2W XFMR	IUF 0 (Zero Seq.)	82.221	Amp	5.935	5.935	5.935	7.2	7.2	7.2
T52 Bank_al_eskan	2W XFMR	LIUR (Pos. Seq.)	24.463	Amp	2.470	3.191	0.721	10.1	13.0	2.9
T52 Bank_al_eskan	2W XFMR	IUF 2 (Neg. Seq.)	24.443	Amp	2.329	2.329	2.329	9.5	9.5	9.5
T52 Bank_al_eskan	2W XFMR	IUF 0 (Zero Seq.)	24.443	Amp	1.074	1.074	1.074	4.4	4.4	4.4
T53 Al_tork	2W XFMR	LIUR (Pos. Seq.)	147.340	Amp	12.526	14.111	1.585	8.5	9.6	1.1
T53 Al_tork	2W XFMR	IUF 2 (Neg. Seq.)	147.037	Amp	14.389	14.389	14.389	9.8	9.8	9.8
T54 Wad_algarnary 3	2W XFMR	LIUR (Pos. Seq.)	24.455	Amp	2.469	3.190	0.721	10.1	13.0	2.9
T54 Wad_algarnary 3	2W XFMR	IUF 2 (Neg. Seq.)	24.435	Amp	2.328	2.328	2.328	9.5	9.5	9.5
T54 Wad_algarnary 3	2W XFMR	IUF 0 (Zero Seq.)	24.435	Amp	1.074	1.074	1.074	4.4	4.4	4.4
T55 Mana'	2W XFMR	LIUR (Pos. Seq.)	29.093	Amp	5.222	5.218	0.003	17.9	17.9	0.0
T55 Mana'	2W XFMR	IUF 2 (Neg. Seq.)	29.092	Amp	2.985	2.985	2.985	10.3	10.3	10.3
T55 Mana'	2W XFMR	IUF 0 (Zero Seq.)	29.092	Amp	3.051	3.051	3.051	10.5	10.5	10.5

For buses and branches below center-tap transformers, Phases A, B, and C correspond to (1), (2), and (N) respectively.

Project:  
Location:  
Contract:  
Engineer:  
Filename: unbalance

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

Page: 98  
Date: 05-03-2017  
SN:  
Revision: Base  
Config.: Normal

### SUMMARY OF TOTAL GENERATION , LOADING & DEMAND

	Phase	MW	Mvar	MVA	% PF
Source (Swing Buses):	A	0.939	0.390	1.017	92.35 Lagging
	B	0.928	0.413	1.016	91.37 Lagging
	C	0.914	0.392	0.995	91.89 Lagging
Source (Non-Swing Buses):	A	0	0	0	
	B	0	0	0	
	C	0	0	0	
Total Demand:	A	0.939	0.390	1.017	92.35 Lagging
	B	0.928	0.413	1.016	91.37 Lagging
	C	0.914	0.392	0.995	91.89 Lagging
Apparent Losses:	A	-0.006	0.018		
	B	0.027	0.059		
	C	0.011	0.034		
System Mismatch:		0.000	0.000		
Number of Iterations:	2				