

Load Flow Analysis

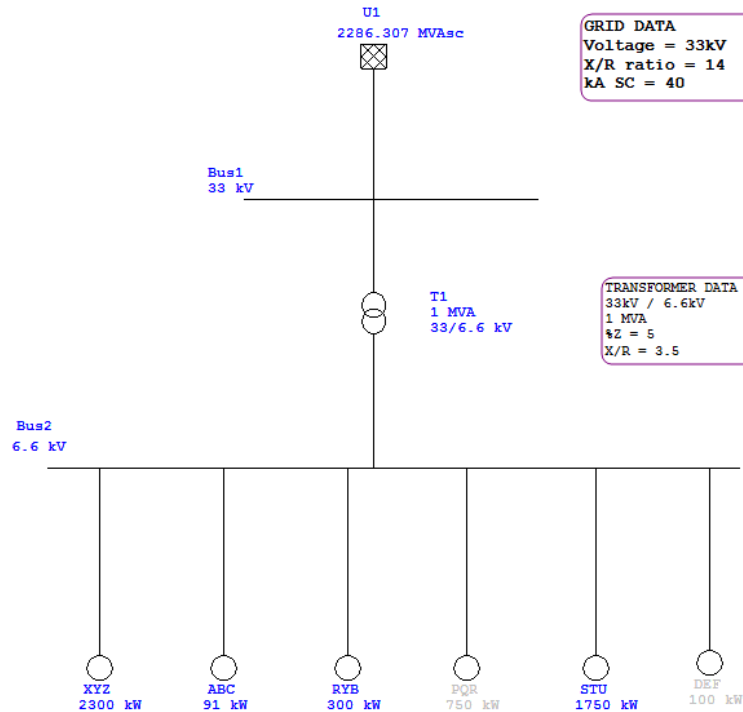
Transformer MVA sizing

Purpose and Description

The purpose of this section is to introduce the transformer sizing calculation.

Procedure

1. Drag and place grid, transformer and induction machine on OLV, connect them & enter the data as shown below.



Use below table to input Induction Motor Parameters.

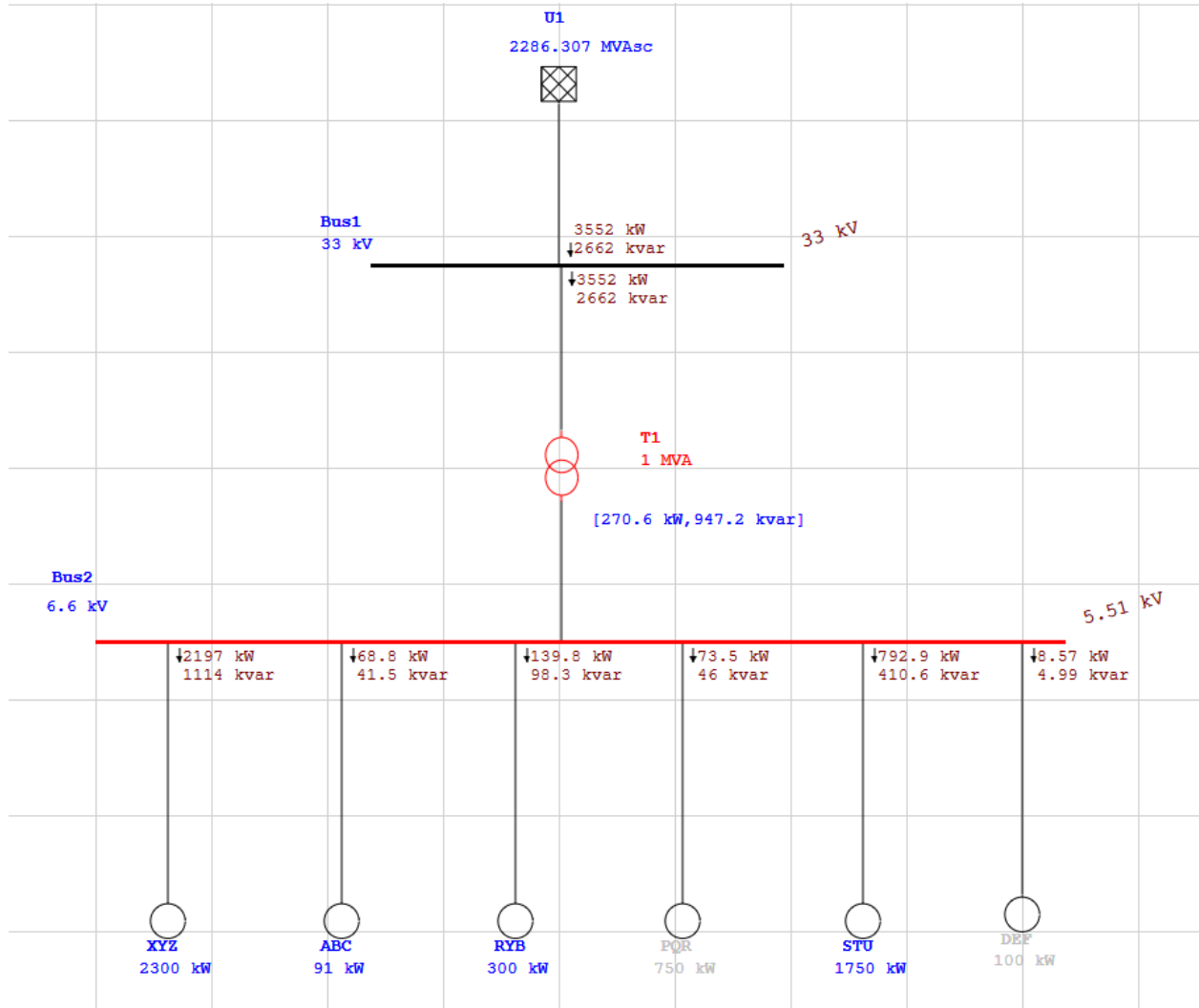
Motor ID	kW Rating	C/I/S	% Load Factor	No of Poles	% Efficiency			%FL Slip	% PF			LRC %	LRC PF %
					100	75	50		100 %	75	50		
XYZ	2300	C	90	2	95	93	91	0.87	90	88	87	420	20
ABC	91	C	70	4	95	93	91	0.87	88	86	84	550	21
RYB	300	I	85	6	93	90	87	0.87	83	81	79	650	22
PQR	750	S	90	4	93	90	87	0.87	86	83	80	650	22
STU	1750	I	85	2	95	93	91	0.87	90	88	87	550	21
DEF	100	S	80	4	95	93	91	0.87	88	86	84	550	21

Load Flow Analysis

- Enter the % demand factor in the Info page of Induction machine.

	Operating Status	Demand Factor in %
C	Continuous	100
I	Intermittent	50
S	Standby or Spare	10

- Run Load flow.



- Double click on T1, go to Sizing page. Check the load connected to transformer.

Load Flow Analysis

Connected Load Calculation:

Input Data				%PF & % EFF considered for 100% LF			Continuous Load		Intermittent Load		Standby (Spare Load)	
Motor ID	kW Rated	C/I/S		LF	%PF @LF	%EFF @LF	$kW = (kW_{rated} * LF) / \%EFF$	$kvar = kW * \tan(\phi)$	$kW = (kW_{rated} * LF) / \%EFF$	$kvar = kW * \tan(\phi)$	$kW = (kW_{rated} * LF) / \%EFF$	$kvar = kW * \tan(\phi)$
			%	%	%	%						
XYZ	2300	C	100	100	90	95	2421.05	1172.57				
ABC	91	C	100	100	88	95	95.79	51.70				
RYB	300	I	50	100	83	93			322.58	216.78		
PQR	750	S	10	100	86	93					806.45	478.52
STU	1750	I	50	100	90	95			1842.11	892.17		
DEF	100	S	10	100	88	95					105.26	56.82
Total Load							2516.84	1224.27	2164.69	1108.95	911.71	535.34
Diversity Factor							1.00		1.00		1.00	
Total Load After Diversity							2516.84	1224.27	2164.69	1108.95	911.71	535.34
NET CONNECTED LOAD							kVA		kW		kvar	
							6285.93		5593.24		2868.55	

2-Winding Transformer Editor - T1
✕

Reliability

Remarks

Comment

Info

Rating

Impedance

Tap

Grounding

Sizing

Protection

Harmonic

1 MVA IEC Liquid-Fill Other 65 C
33 6.6 kV

Transformer Loading

	MVA	MW	Mvar
Operating	4.439	3.552	2.662
Connected	6.286	5.593	2.869

☒ Spare Loads

Impedance

BIL Limit 0 kV

☐ Limit Short-Circuit kA

@ Prim. 0.35

@ Sec. 1.75

Load Variation

Growth Factor 100 %

Load Factor 100 %

Installation

Altitude 1000 m

Ambient Temp. 30 °C

Options

☐ Growth Factor for Max. MVA

Load Flow Analysis

Operating Load Calculation:

%PF @LF= Forecasted value of power factor at the required LF by using appropriate tool and formulae.

%EFF @LF= Forecasted value of efficiency at the required LF by using appropriate tool and formulae.

%PF & % EFF considered at given LF			Continuous Load		Intermittent Load		Standby (Spare Load)	
LF	%PF @LF	%EFF @LF	kW=(kWrated*LF) / %EFF@LF	kvar= kW*tan(Ø)	kW=(kWrated*LF) / %EFF@LF	kvar= kW*tan(Ø)	kW=(kWrated*LF) / %EFF@LF	kvar= kW*tan(Ø)
%	%	%						
90	89.23	94.20	2197.45	1111.56				
70	85.60	92.60	68.79	41.55				
85	81.80	91.20			279.61	196.62		
90	84.80	91.80					735.29	459.56
85	88.93	93.80			1585.82	815.37		
80	86.40	93.40					85.65	49.91
Total Load			2266.24	1153.10	1865.43	1011.98	820.95	509.47
Diversity Factor			1.00		0.50		0.10	
Total Load After Diversity			2266.24	1153.10	932.71	505.99	82.09	50.95
NET CONNECTED LOAD			kVA		kW		kvar	
			3699.94		3281.05		1710.04	

2-Winding Transformer Editor - T1

Reliability
Remarks
Comment

Info
Rating
Impedance
Tap
Grounding
Sizing
Protection
Harmonic

1 MVA IEC Liquid-Fill Other 65 C
33 6.6 kV

Transformer Loading

	MVA	MW	Mvar
Operating	4.439	3.552	2.662
Connected	6.286	5.593	2.869

☒ Spare Loads

Impedance

BIL Limit kV

☐ Limit Short-Circuit kA

@ Prim. @ Sec.

Load Variation

Growth Factor %

Load Factor %

Installation

Altitude m

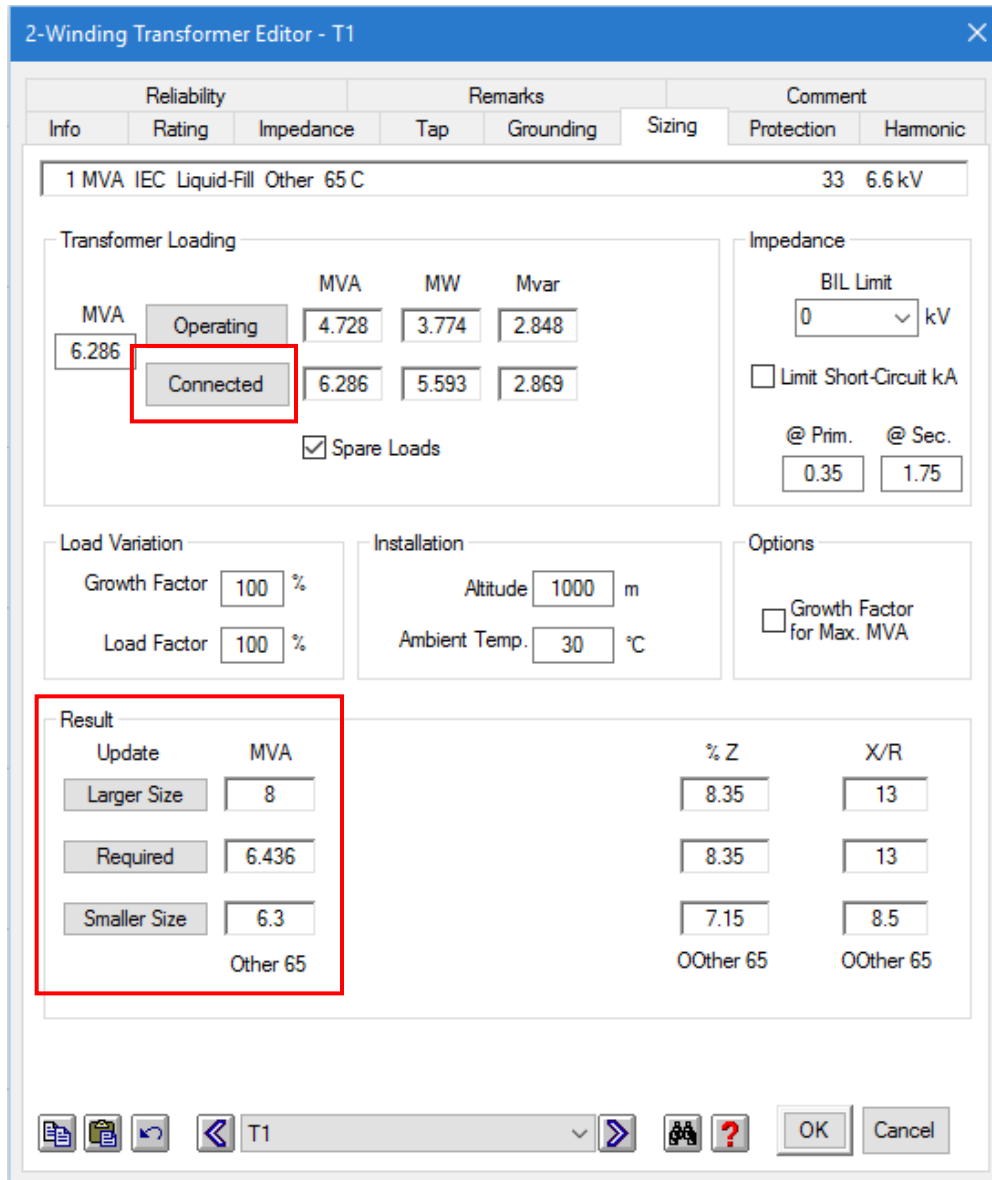
Ambient Temp. °C

Options

☐ Growth Factor for Max. MVA

Load Flow Analysis

5. Check the results for Required, Larger Size and Smaller Size for connected load by clicking on the option 'connected' as shown below.



2-Winding Transformer Editor - T1

Reliability		Remarks		Comment	
Info	Rating	Impedance	Tap	Grounding	Sizing
1 MVA IEC Liquid-Fill Other 65 C					33 6.6 kV

Transformer Loading

MVA	Operating	MVA	MW	Mvar
6.286	Connected	4.728	3.774	2.848
		6.286	5.593	2.869

☒ Spare Loads

Impedance

BIL Limit: 0 kV

☐ Limit Short-Circuit kA

@ Prim. 0.35 @ Sec. 1.75

Load Variation

Growth Factor: 100 %

Load Factor: 100 %

Installation

Altitude: 1000 m

Ambient Temp.: 30 °C

Options

☐ Growth Factor for Max. MVA

Result

Update	MVA	% Z	X/R
Larger Size	8	8.35	13
Required	6.436	8.35	13
Smaller Size	6.3	7.15	8.5

Other 65

OK Cancel

6. Check the results for Required, Larger Size and Smaller Size for operating load by clicking on the option 'operating' as shown below.

Load Flow Analysis

2-Winding Transformer Editor - T1

Reliability		Remarks		Comment	
Info	Rating	Impedance	Tap	Grounding	Sizing
1 MVA IEC Liquid-Fill Other 65 C					33 6.6 kV

Transformer Loading

MVA	MW	Mvar
Operating	4.439	3.552
Connected	6.286	5.593

☒ Spare Loads

Impedance

BIL Limit: 0 kV

☐ Limit Short-Circuit kA

@ Prim. @ Sec.
0.35 1.75

Load Variation

Growth Factor: 100 %

Load Factor: 100 %

Installation

Altitude: 1000 m

Ambient Temp.: 30 °C

Options

☐ Growth Factor for Max. MVA

Result

Update	MVA	% Z	X/R
Larger Size	5	7.15	8.5
Required	4.545	7.15	8.5
Smaller Size	4	7.15	8.5

Other 65