

KB Number: HT0005

Title: How to Model Series Line Reactors

Date: 5/30/2013

Name: Satish Shrestha

Keywords: Series, Line Reactor, CL Reactor, inductor

This example shows how to model the reactor in EasyPower based on manufacturer data.

Manufacturer Data

Here is the screenshot from manufacturer's datasheet. We are modeling for the item "1321-3R4-C".

Sizing Guidelines

Fundamental amps are used for sizing the reactor to be equal to or slightly higher than the total motor FLA. Sizing reactors to drive ampere ratings alone may result in mis-sizing the reactor.

Catalog Number	Fundamental Amps	Inductance - mH (Based on Fundamental Amps)	Watts Loss	Dimensions in mm (in.) and Weight in kg (lbs.)					
				A	B	C	D ⁽¹⁾	E	Weight
1321-3R1-A	1	100.0	14	112 (4.40)	104 (4.10)	79 (3.10)	60 (2.35)	37 (1.44)	1.8 (4)
1321-3R1-B		50.0	14.8	112 (4.40)	104 (4.10)	71 (2.80)	50 (1.98)	37 (1.44)	1.8 (4)
1321-3R1-C		36.0	12	112 (4.40)	104 (4.10)	71 (2.80)	50 (1.98)	37 (1.44)	1.4 (3)
1321-3R1-D		18.0	5	112 (4.40)	104 (4.10)	71 (2.80)	50 (1.98)	37 (1.44)	1.4 (3)
1321-3R2-A	2	12.0	7.5	112 (4.40)	104 (4.10)	71 (2.80)	50 (1.98)	37 (1.44)	1.8 (4)
1321-3R2-B		20.0	11.3	112 (4.40)	104 (4.10)	71 (2.80)	50 (1.98)	37 (1.44)	1.8 (4)
1321-3R2-C		32.0	16	112 (4.40)	104 (4.10)	71 (2.80)	50 (1.98)	37 (1.44)	1.8 (4)
1321-3R2-D		6.0	10.7	112 (4.40)	104 (4.10)	64 (2.50)	44 (1.73)	37 (1.44)	1.4 (3)
1321-3R4-A	4	3.0	14.5	112 (4.40)	104 (4.10)	71 (2.80)	50 (1.98)	37 (1.44)	1.8 (4)
1321-3R4-B		6.5	20	112 (4.40)	104 (4.10)	71 (2.80)	50 (1.98)	37 (1.44)	1.8 (4)
1321-3R4-C		9.0	20	112 (4.40)	104 (4.10)	86 (3.40)	60 (2.35)	37 (1.44)	2.3 (5)
1321-3R4-D		12.0	21	112 (4.40)	104 (4.10)	86 (3.40)	66 (2.60)	37 (1.44)	2.7 (6)
1321-3R8-A	8	1.5	19.5	152 (6.00)	121 (4.75)	76 (3.00)	53 (2.10)	51 (2.00)	3.2 (7)
1321-3R8-B		3.0	29	152 (6.00)	121 (4.75)	76 (3.00)	53 (2.10)	51 (2.00)	3.6 (8)
1321-3R8-C		5.0	25.3	152 (6.00)	121 (4.75)	86 (3.40)	67 (2.62)	51 (2.00)	5.0 (11)
1321-3R8-D		7.5	28	152 (6.00)	121 (4.75)	86 (3.40)	63 (2.48)	51 (2.00)	5.9 (13)

Relevant Data

FLA = 4A

Inductance, L = 9.0 mH

Watts Loss = 20 watts

Calculations

Reactance, $X = 2 * \pi(f) * L = 2 * 3.14 * 60 * 9.0e-3 = 3.39 \text{ Ohms}$.

$R = \text{Loss} / 3 / \text{FLA}^2 = 20 / 3 / 4^2 = 0.4167 \text{ Ohms}$.

$X/R = 3.39 / 0.4167 = 8.14$.

Assume $X0 = X$.

C. L. Reactor Data

Connection Information

ID Name: CLR-1

From Bus: BUS-1 Base kV = 0.48

To Bus: BUS-2 Base kV = 0.48

Specifications Harmonics Comments Hyperlinks

C. L. Reactor Specifications

Ampacity: 4

Impedance kVA: (3-Phase)

Material

☒ Copper

☐ Aluminum

☐ High-Q Aluminum

Impedances (Ohms)

X1: 3.39 X0: 3.39 X/R: 8.14 Calculate

OK Cancel Help

Enter the values in the CL Reactor dialog as shown above. Do not press Calculate button, because it will replace with typical values.

You can leave the Impedance kVA blank.