## x3pdy (3-Phase Delta-to-Y Transformer)

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|---|---|
| **Associated Symbols:** | `x3pdy` |
| **License Requirements:** | OPT_TEMPLATE_LIB |
| **Part Category:** | Magnetic Templates |
| **Related Topics:** | Introduction to Magnetic Templates |

### Functional Description

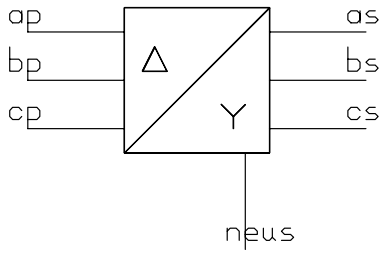
The **x3pdy** model is a linear, three-phase, two-winding transformer in a delta-to-Y configuration. You can specify either electrical arguments (`lp`, `ls`) or magnetic arguments (`np`, `ns`, `len`, `area`, `ur`). Values for electrical arguments override those for magnetic arguments. The `k`, `rp`, and `rs` arguments are used with both electrical and magnetic arguments.

### Template Description Sections



### x3pdy Connection Points

| Name | Type | Description |
|---|---|---|
| `ap` | `electrical` | phase a, primary winding |
| `bp` | `electrical` | phase b, primary winding |
| `cp` | `electrical` | phase c, primary winding |
| `as` | `electrical` | phase a, secondary winding |
| `bs` | `electrical` | phase b, secondary winding |
| `cs` | `electrical` | phase c, secondary winding |
| `neus` | `electrical` | neutral secondary connection |




**Three-phase delta-to-Y transformer (x3pdy)**

### x3pdy Symbol Properties

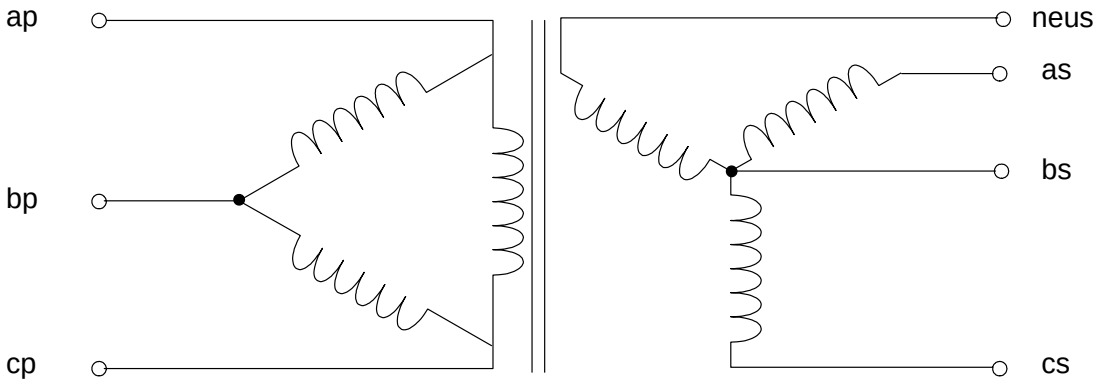
**Property**

| | | |
|---|---|---|
| primitive | Description: | This symbol calls the template **x3pdy**, which models a 2-winding transformer in the three-phase delta to y configuration template that allows you to specify electrical arguments (lp, ls) or magnetic arguments (np, ns, len, area, ur). Specifying electrical arguments overrides the magnetic arguments. |
| ref | Description: | Suffix appended to a template name that uniquely identifies a part in a schematic. |
| | Default: | If not specified, is assigned by the schematic capture tool |
| | Example Input: | Can be any alpha_numeric string |
| lp | Description: | Inductance of primary winding. Specifying lp and ls overrides the magnetic arguments (np, ns, len, area, ur ). |
| | Default (units): | undef<br>(H) |
| | Example Input: | 3e-2 |
| ls | Description: | Inductance of secondary winding. Specifying lp and ls overrides the magnetic arguments (np, ns, len, area, ur ). |
| | Default (units): | undef<br>(H) |
| | Example Input: | 2e-3 |
| np | Description: | Number of winding turns in primary winding |
| | Default (units): | undef<br>(turns) |
| | Example Input: | 60 |
| ns | Description: | Number of winding turns in secondary winding |
| | Default (units): | undef<br>(turns) |
| | Example Input: | 4 |
| len | Description: | Magnetic path length of core |
| | Default (units): | undef<br>(m) |
| | Example Input: | 3e-2 |
| area | Description: | Cross-sectional area of magnetic path |
| | Default (units): | undef<br>($m^2$) |
| | Example Input: | 6e-5 |
| ur | Description: | Relative permeability of linear core |
| | Default (units): | 1<br>(—) |
| | Example Input: | 1 |
| k | Description: | Coupling coefficient (see Usage Notes). |
| | Default (units): | 1<br>(—) |
| | Example Input: | 0.98 |
| rp | Description: | Winding resistance of primary winding |
| | Default (units): | 0<br>(Ω) |
| | Example Input: | 1m |
| rs | Description: | Winding resistance of secondary winding |

| | |
|---|---|
| Default (units): | 0<br>(Ω) |
| Example Input: | 1m |

### x3pdy Usage Notes

The **x3pdy** model constructs a delta-to-Y, three-transformer configuration using the `xfr` model (linear, two-winding transformer). This configuration of three primary windings and three secondary windings is shown in the following figure.




**Three-phase delta-to-Y transformer**

Each instance of the **xfr** transformer uses the same argument values from **x3pdy** (i.e., each primary winding has the same specifications as the other two primaries; each secondary winding has the same specifications as the other two secondaries).

You can specify a value for the coupling coefficient (`k`) in the following range:

```
-1 ≤ k ≤ +1
```

For an iron core, the value of `k` is nearly 1. For an air core, `k` assumes a very small positive value. If `k` is specified less than zero, it reverses the polarity of the transformer.