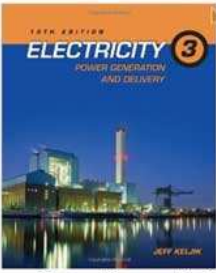


How to wire 3-phase



Power Generation and Delivery

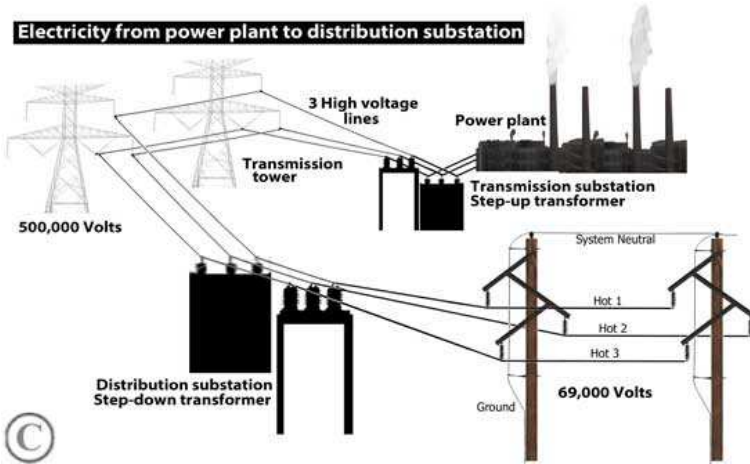
Buy Related Books:

- [3-phase power generation book at Amazon](#)
- [3-phase wiring books at Amazon](#)

Resource:

- [What is 3-phase/ from power plant to end user/ with illustrations Electricians forum](#)

Electricity from power plant to distribution substation



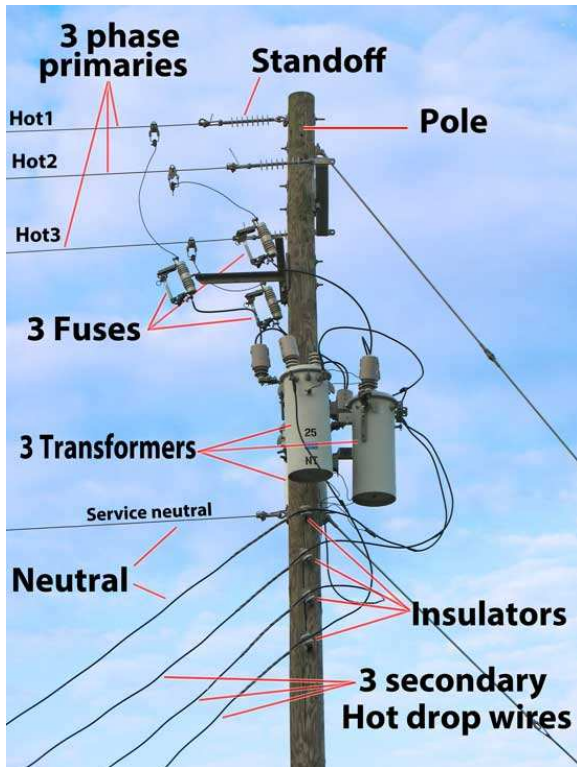
[Larger image](#)

3-phase is 3 Hot wires from power plant:

Power plant produces 3-phase
Step down transformers at power plant reduce amperage and increase voltage
High voltage and low amperage means less heat loss during transmission
Example transmission tower brings 500,000 volts to local substation
Many different voltage lines leave power plant going different directions
High voltage arrives at local substation
Local substation transformers lower voltage and increase amperage
Wooden poles leave local substation carrying 69,000 volts or other voltages
Primary distribution voltages range from 2,400 Volts to 69,000 Volts.
Below 1,500 Volts increases distribution cost due to heat loss from high voltages
Local substations lower voltage increase amperage again. This power is used for residential and commercial businesses.
For example Hot wire supplying power to household transformer might be 240 Volts

Resource:

- [Electric power distribution system operation 1990/ pdf](#)



[Larger image](#)

3-Phase voltage is determined by transformer

3-transformer 3-phase

3 Hot wires arrive at power pole
Drop lines from each hot wire enter 3 separate transformers.

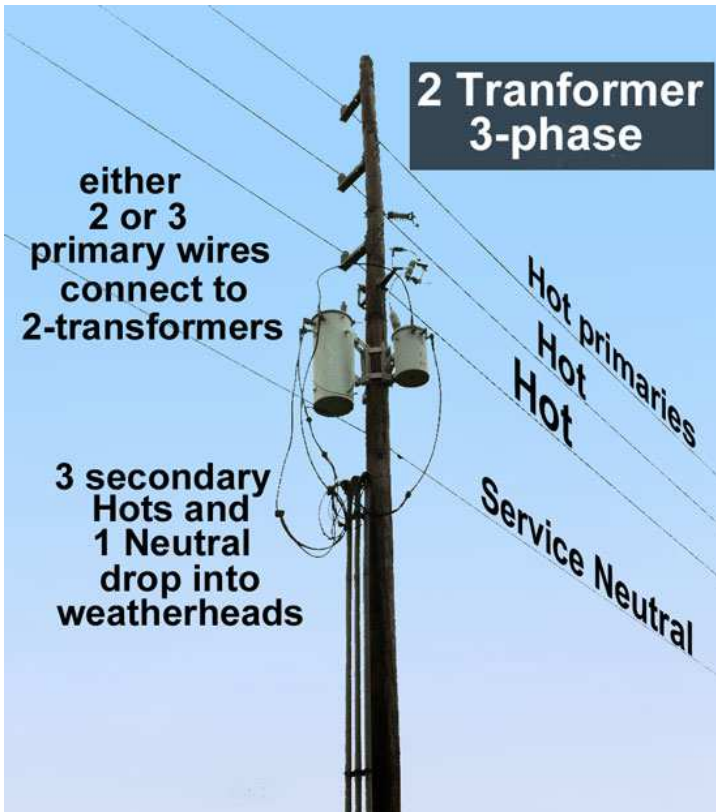
Transformers can be different at each location
Different transformers and transformer configurations produce different secondary voltages
Transformers are wired together to produce Delta configuration, or Wye configuration
3-wire Primary Wye to 4-wire secondary Wye
3-wire primary Delta to 3-wire secondary Delta
4-wire primary Wye to 3-wire secondary Delta
3-wire primary Delta to 4-wire secondary Wye
[See illustrations/ pdf](#)

Generally, 3 secondary Hot wires and a neutral building. Other applications do not have neutral

Having Neutral wire gives more voltage options for electrician.
Combination of Hots and neutral give wide variety of voltages in US a 240-120V, 208-120V, 230-133V, 400-230v, 415-230v, 480-277V, 600-277V

Resources:

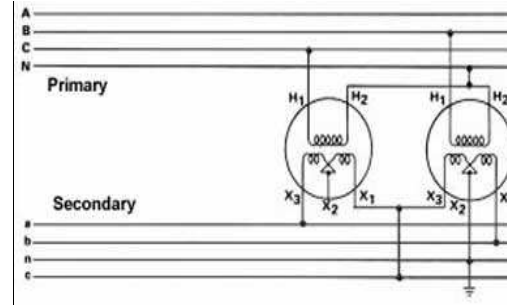
- [See chart of 3-phase worldwide](#)
- [Transformer basics](#)
- [Basic-3-phase-transformer-training.pdf](#)
- [3-phase circuits with basic math/ pdf](#)
- [Distribution transformers with illustrations/ pdf](#)
- [Distribution transformers 2 / pdf](#)
- [Distribution transformers 3/ pdf](#)
- [Common wiring configurations/ pdf](#)



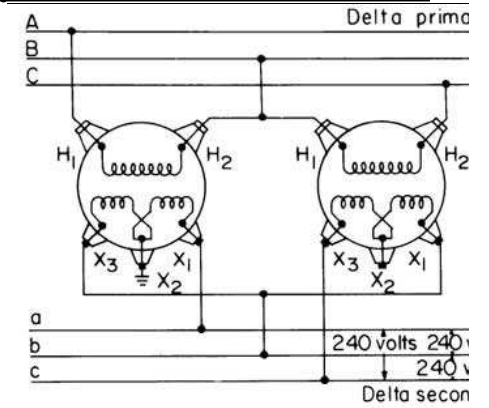
2 transformer 3-phase for smaller loads

Third transformer added when load exceeds capacity of two tra

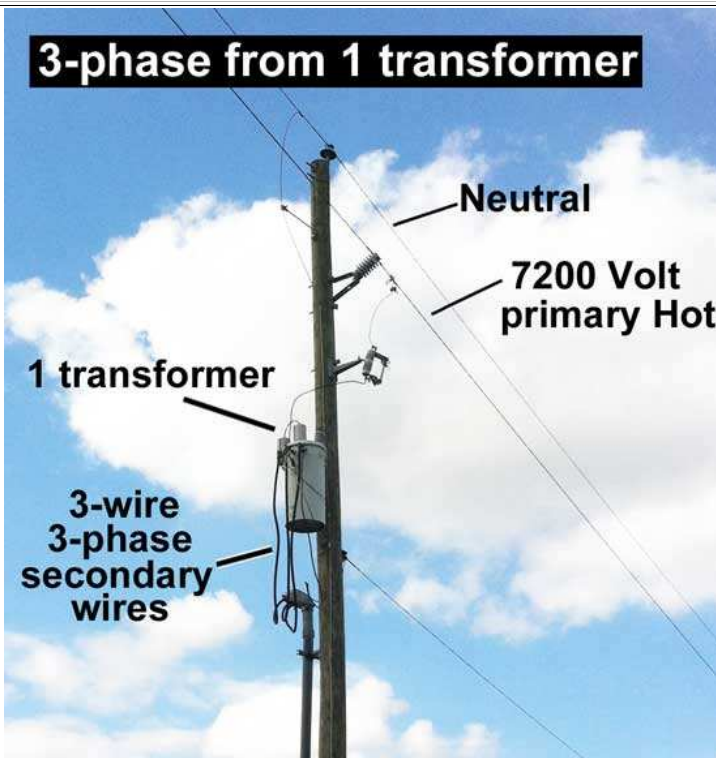
2 primary Hots connect to 2 transformers



3 primary hots connect to 2 transformers



[Transformer wiring illustra](#)



3-phase from 1 transformer

Residential neighborhood wiring can provide 3-phase service Single 7200 Volt primary Hot wire and Neutral connect to sing Transformer converts single phase into 3-wire 3-phase

This service provides power to small in-home beauty shop



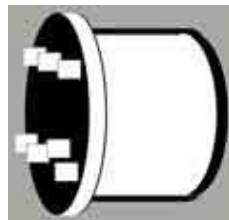
[Larger image](#)
[Different image](#)

3 phase weatherhead, meter and breaker pa

3 Hot wires and 1 Neutral wire arrives at service

Resources:

[Electric service installation/ pdf](#)
[3-phase wiring specs/ pdf](#)



3 phase meter has 7 prongs

1 prong for Neutral

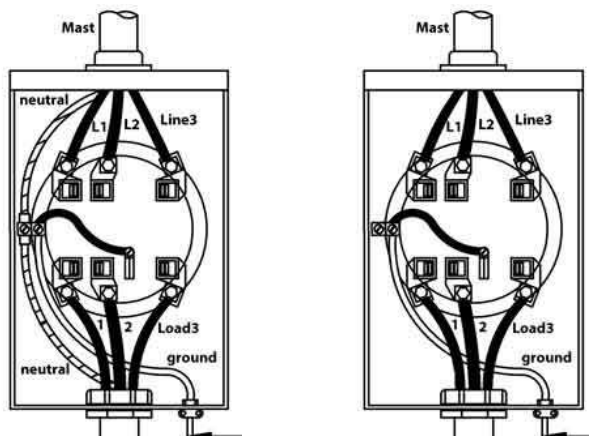
3 prongs for incoming Hot wires

3 prongs for Hot wires going to breaker panel

High leg delta: High leg connects to prongs on right of neutral

Resource:

[Buy 3-phase electric meter](#)



With neutral
[Larger image](#)

Without neutral
[Larger image](#)

Example 3 phase meter box illustration/

With and w/out neutral

If service does not have neutral wire, then ground wire still cor
 Meter stabs into meter box.

Always turn off all breakers and electric usage when removing surge

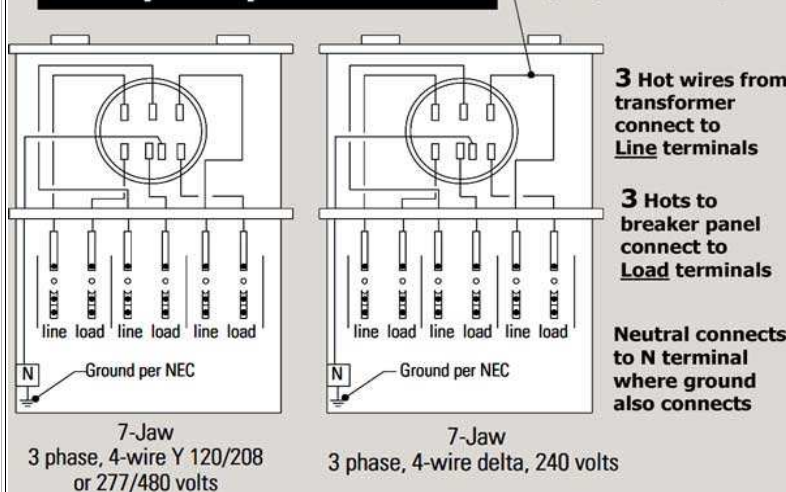
Wires leave meter box and enter the breaker panel

High leg delta: High leg connects to terminals on right of neut
 High leg wiring will have neutral wire

Resource:

[3-phase meter box wiring/ pdf](#)
[Single-phase meter wiring/ pdf](#)

Example 3-phase meters

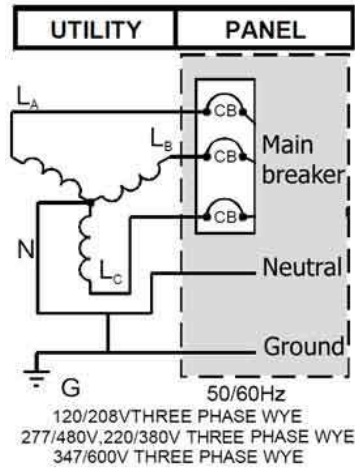
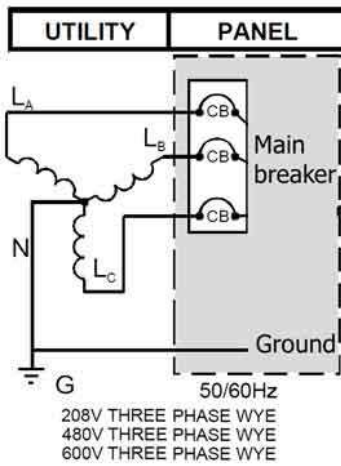


Meter box illustration: 4-wire Wye and Delt

Illustration on right shows location of High Leg
 Both illustrations are identical for Wye and Delta

Resources:

[Example service installation manual](#)
[How to wire 3-phase electric meter](#)



More voltages are available when panel has

Look at caption below each illustration on left
Without Neutral, then panel has 208V
With Neutral, then panel has both 208V and 120V

Test across any two Hot wires shows 208V, while testing Hot to

$$\text{Line-to-line voltage} = \text{line to neutral} \times \sqrt{3}$$

$$\sqrt{3} = 1.732$$

$$120V \times 1.732 = 208V$$

Same with 480V-277V: Test across any two hot wires shows 480V

Exception is High leg delta, where testing across any two Hot to Neutral shows 120V or 208V

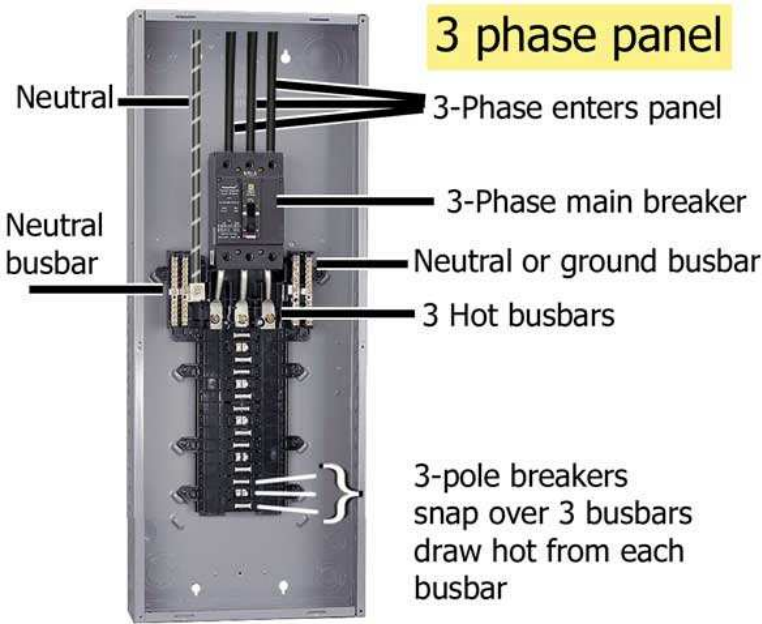
Resources:

See more wiring diagrams/ scroll down page

See wiring diagram for High leg delta/ scroll down page

[Formulas for 3-phase](#)

[Estimate line-to-line voltages](#)



[Larger image](#)

Example 3 phase breaker panel

Generally 3 hot wires from meter attach to 3-pole main breaker
Neutral connects to Neutral busbar

Ground wire (not shown) connects to ground busbar.

Some services do not have Neutral wire, and neutral busbar is

If both busbars on either side of hot busbars are used for Neutral added inside panel.

3-pole breakers fit over each 3 Hot busbars

There are 3 hot busbars in 3-phase panel.

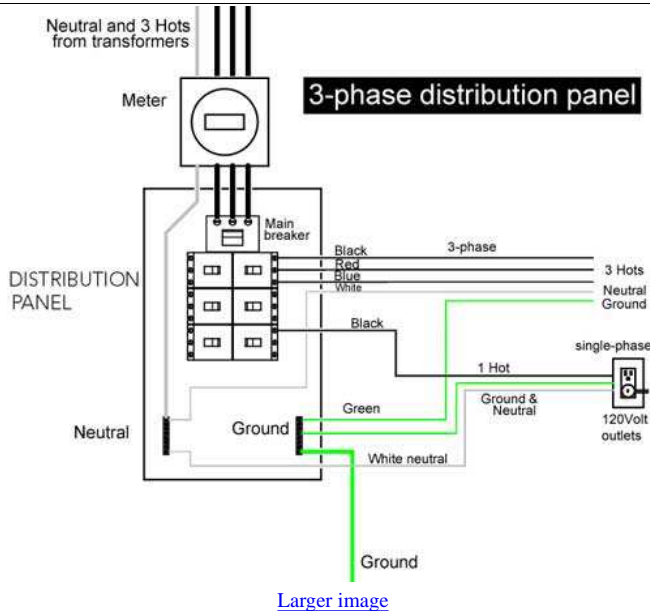
Each hot wire supplies power to separate busbar

Illustration shows where 3-pole breaker snaps into place



Buy:

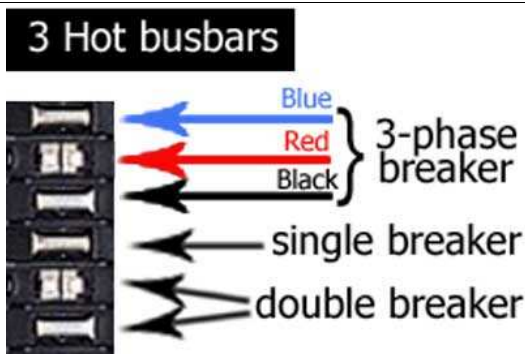
[3-phase panel, s](#)
[Amazon](#)



[Larger image](#)

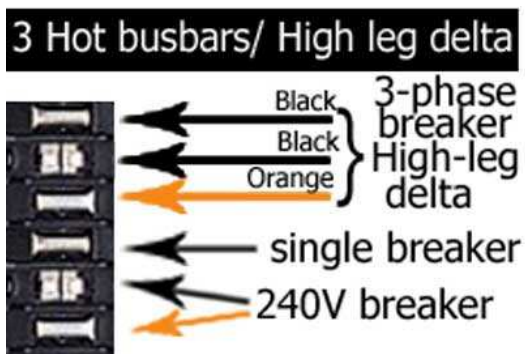
3-phase distribution panel/ Example 120-208

4-wire
 3 Hot and 1 Neutral enter meter box
 3 Hot and 1 Neutral enter distribution panel
 3-pole breakers snap onto busbars
 3-pole breaker supplies power to 3-phase circuit with 3 Hot wires, with
 1 Hot is drawn from a 3-pole breaker
 1 Hot and Neutral supply power to 120 Volt outlets




Each hot busbar looks different for ez identi

3-phase breaker snaps over 3 hot busbars
 Example 3-pole or 3-phase breaker would snap over 3 hot bus connected to breaker.



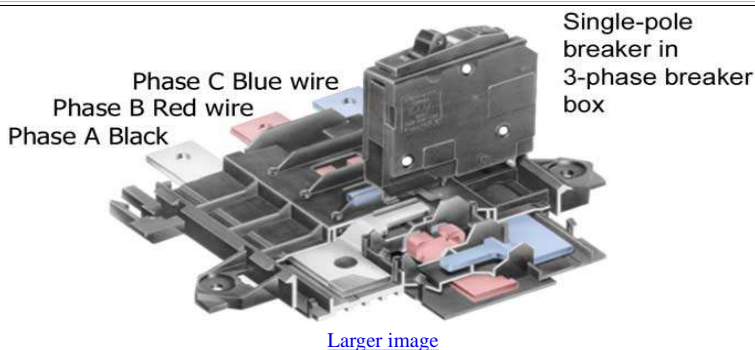
Wire colors vary

For example high-leg Delta the high leg is orange colored wire
 High leg is orange wire and is always 3rd wire down
 Other countries have different wire colors

High leg wire color is orange. 

3-phase 240Volt
 High leg to other legs 240Volt
 High leg to Neutral 208Volt
 Other legs to neutral 120Volt
 Other legs to each other 240Volt

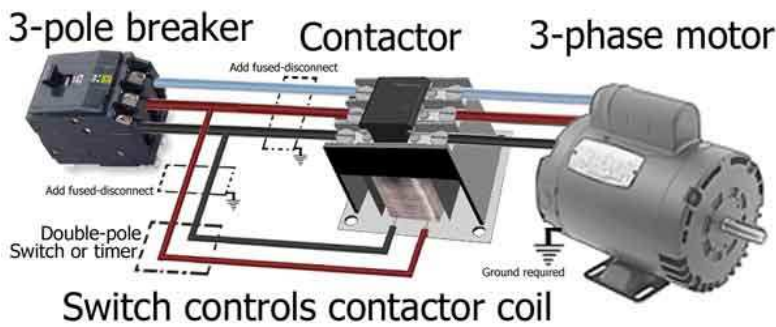
Resource:
[Wire color codes at Wikipedia](#)



[Larger image](#)

Example single-pole breaker in 3-phase panel

Color added for illustration
[Colors](#)



Switch controls contactor coil

[Larger image](#)

Example 3 phase circuit

Wire colors vary
 3-phase breaker located in panel
 3-phase 3-wire goes to contactor (or motor starter) and then to
 Grounding indicated, but ground wire not shown
 No neutral wire shown, and not needed for example motor circuit
 2 Hot wires pulled from 3-phase go to double-pole switch or timer
 Switch or timer activates motor starter or contactor, which starts

Fused disconnect added between breaker and starter and motor
 Required by code to protect anyone servicing motor and to protect
 Fused disconnect added between 3-phase and double-pole switch
 Required by code to protect anyone working on circuit, and to

Resource:

- [How to wire 3-phase timer](#)
- [3-phase motor starter wiring/ pdf](#)

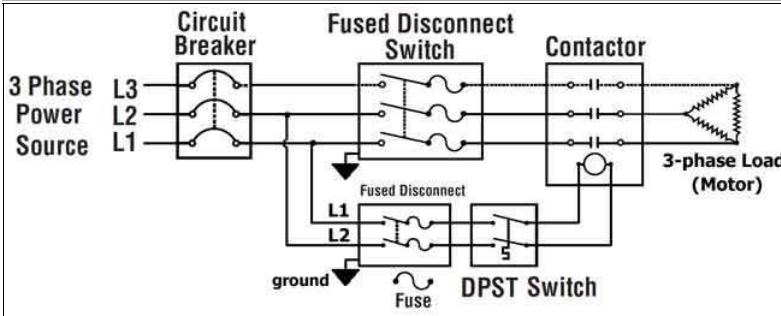
Buy:

- [3-pole contactors at Amazon](#)
- [3-pole disconnect at Amazon](#)
- [Leviton MS302-DS 600Volt 30 amp double-pole motor switch](#)
- [MS303-DS 30 amp 3-phase motor starter](#)



3-phase motor starter

T side is for motor
 L side is Line from breaker
 Wire colors can connect to any of the 3 terminals
 Wire colors must be opposite each other on T and L sides
Buy:
[3-pole contactors at Amazon](#)
[3-pole disconnect at Amazon](#)
[Leviton MS302-DS 600Volt 30 amp double-pole motor switch](#)
[MS303-DS 30 amp 3-phase motor starter](#)



[Larger image](#)

Schematic showing same circuit above

Wiring from breaker panel to motor

Resources:

- [How to wire 3-phase timer](#)
- [3-phase 2-speed electric motor](#)
- [Cooper phase wiring diagrams](#)
- [3-phase motor wiring diagrams](#)
- [Formulas for 3-phase](#)



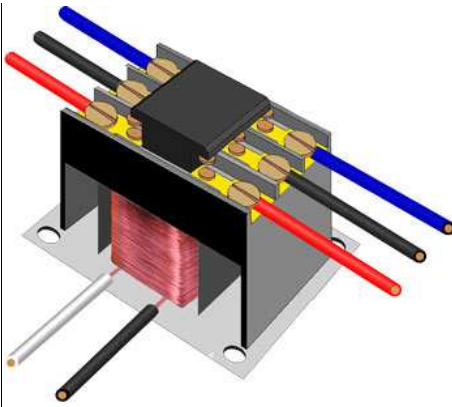
Heavy amp loads: 20-90 amps
 L terminals for Line wires from breaker
 T terminals for load wires

Buy 3-pole contactors/ AC ratings

- [3-pole contactors at Amazon](#)
- [Noark 3 pole contactor](#)
- [Packard 3-pole contactor](#)
- [Mars 2-pole and 3-pole contactors at Amazon](#)
- [Schneider contactor at Amazon](#)
- [Kripal 3-pole contactor](#)
- [Furnas contactor at Amazon](#)
- [siemens 3-pole contactor](#)
- [Eaton 3 pole contactors with contact block connection](#)
- [Allen-bradley 3 pole contactor](#)

3-pole 120Volt coil

- [25 amp 3-pole 120V coil](#)
- [30 amp 120 volt coil](#)
- [30 amp 3-pole 120V coil](#)
- [40 amp 120V coil at Amazon](#)
- [40 amp 120V coil](#)
- [40 amp /120V coil at Amazon](#)
- [50 amp 120V coil](#)
- [60 amp / 3 pole 120 volt coil](#)
- [60 amp 3-pole 120Volt coil](#)



3-pole definite purpose Contactor sizes approximately:
 20-40 amp 3" tall x 2.4" wide
 50-60 amp 3.75" tall x 2.7 wide
 75-90 amp 4.5" tall x 3.5 wide



Light amp loads: 8-12 amps/ connection for contact block
 A1 A2 coil voltage
 L terminals for Line wires from breaker
 T terminals for load wires
 Terminals 13-14 NO / terminals 21-22 NC
 Other terminals apply to auxiliary blocks

Resources:

- [How to wire schneider contactor](#)
- [Difference between contactor and relay](#)
- [How to wire 3-phase](#)
- [DC relays for solar power](#)

- [75 amp 3-pole 120V coil](#)
- [90 amp 3-pole 120 volt coil](#)

3--pole 24 Volt DC coil

[Siemens 3RT10 up to 460 volt 5 Hp with auxiliary contacts](#)

3 pole 24Volt coil

- [90 amp 3-pole 24Volt lug connection](#)
- [75 amp 3-pole 24V coil](#)
- [75 amp 3-pole 24V coil](#)
- [60 amp 3-pole 24V coil](#)
- [50 amp 3-pole 24V coil](#)
- [40 amp 3-pole 24V coil](#)

3 pole 240Volt coil

- [90 amp 3-pole 240Volt coil Amazon](#)
- [90 amp 3-pole 208-240Volt coil](#)
- [75 amp 3-pole 240V coil](#)
- [70 amp 3-pole 240V coil](#)
- [50 amp 240V coil](#)
- [30 amp 3-pole 240V coil](#)

3 pole 277volt coil

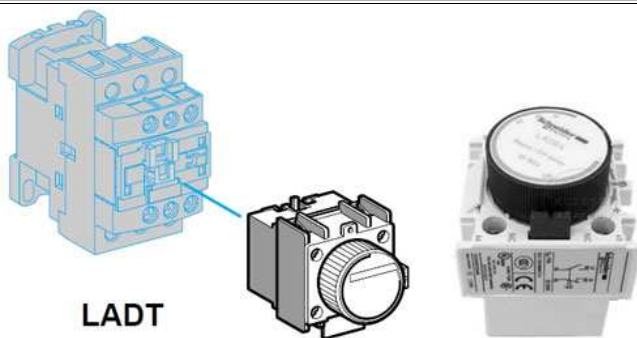
- [90 amp 277V coil 3-pole lug terminals](#)
- [75 amp 277V coil 3-pole lug terminals](#)
- [60 amp 3-pole 277v coil](#)
- [50 amp 3-pole 277V coil](#)
- [40 amp 3-pole 277V coil](#)
- [30 amp 277V coil 3-pole](#)
- [20 amp 3-pole 277V coil](#)

3-pole 380 volt coil

- [40 amp](#)

3 pole 480Volt coil

- [40 amp 480V coil at Amazon](#)
- [40 amp 480V coil at Amazon](#)
- [50 amp 480V coil](#)
- [60 amp 480V coil at Amazon](#)
- [75 amp 480V coil at Amazon](#)
- [75-90 amp 480V coil at Amazon](#)
- [90 amp 3-pole 480V coil](#)
- [100 amp 480V coil at Amazon](#)



Contact blocks/ pneumatic timer attachment

Activated by mechanical action of contactor, instead of electric current
 On delay timers delay start time./
 Once the timer block activates, the countdown begins.
 When countdown ends, the timer's internal relay activates.
 Adding timer block, allows the contactor to control additional circuit v

Buy Contact blocks at Amazon

[Delay contact block at Amazon](#)

AC Motor Full Load Running Current and Recommended Transformer Ratings ①													
Horsepower	110-120V				220-240V②				440-480V				Sing Amps
	Single Phase		Three Phase		Single Phase		Three Phase		Single Phase		Three Phase		
	Amps	KVA	Amps	KVA	Amps	KVA	Amps	KVA	Amps	KVA	Amps	KVA	
1/2	9.8	1.5	4.0	3	4.9	1.5	2.0	3	2.5	1.5	1.0	3	2.0
3/4	13.8	2.0	5.6	3	6.9	2.0	2.8	3	3.5	2.0	1.4	3	2.8
1	16.0	3.0	7.2	3	8.0	3.0	3.6	3	4.0	3.0	1.8	3	3.2
1 1/2	20.0	3.0	10.4	3	10.0	3.0	5.2	3	5.0	3.0	2.6	3	4.0
2	24.0	5.0	13.6	6	12.0	5.0	6.8	6	6.0	5.0	3.4	6	4.8
3	34.0	5.0	19.2	6	17.0	5.0	9.6	6	8.5	5.0	4.8	6	6.8
5	56.0	7.5	30.4	9	28.0	7.5	15.2	9	14.0	7.5	7.6	9	11.2
7 1/2	80.0	15	44.0	15	40.0	15	22.0	15	21.0	15	11.0	15	16.0
10	100.0	15	56.0	15	50.0	15	28.0	15	26.0	15	14.0	15	20.0
15	135.0	25	84.0	30	68.0	25	42.0	30	34.0	25	21.0	30	27.0
20	—	—	108.0	30	88.0	25	5.0	30	44.0	25	27.0	30	35.0
25	—	—	136.0	45	110.0	37.5	68.0	45	55.0	37.5	34.0	45	44.0
30	—	—	160.0	45	136.0	37.5	80.0	45	68.0	37.5	40.0	45	54.0
40	—	—	208.0	75	176.0	50	104.0	75	88.0	50	52.0	75	70.0
50	—	—	260.0	75	216.0	75	130.0	75	108.0	75	65.0	75	86.0
60	—	—	—	—	—	—	154.0	75	—	—	77.0	75	—
75	—	—	—	—	—	—	192.0	112.5	—	—	96.0	112.5	—
100	—	—	—	—	—	—	248.0	112.5	—	—	124.0	112.5	—

- ① Recommended KVA rating shown in chart includes aluminum of 10% spare capacity for frequent motor starting.
 ② To obtain full-load currents for 200 and 208 volt motors, increase corresponding 220-240 volt ratings by 15 and 10% respectively.

[Larger image](#)



[Larger image](#)

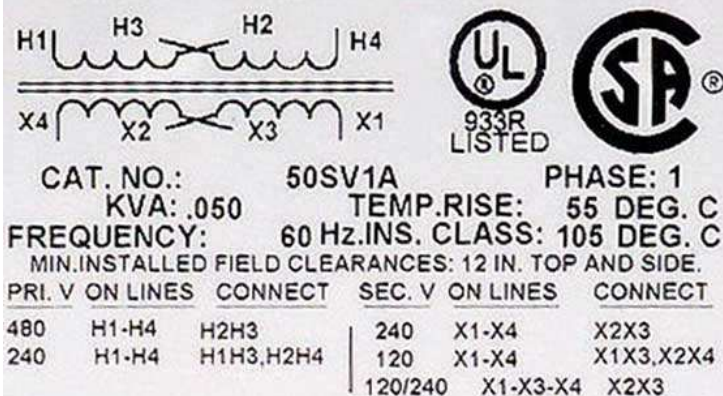
Type 3R outdoor enclosure

Buck-boost transformer/ buck down-boost u

Buck voltage down
 Or boost voltage up.

This single-phase transformer bucks down voltage.
 Convert 240Volt to 120Volt without neutral wire from breaker
 Convert 2-wire 480Volt to 240Volt or 120Volt

Buy:
[Square D transformers at Amazon](#)
 Allow 12" clearance top and sides



[Larger image](#)

Example: Buck-boost transformer wiring

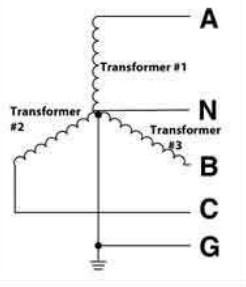
Primary wiring input:
 480Volt primary input connects to H1 H4, and then H2 and H3
 OR
 240Volt primary input connects to H1 H4, and then H3 connect

Secondary wiring output
 240Volt secondary output connects to X1 X4, and then X2 and
 OR
 120Volt secondary output connects to X1 X4, and then X3 connect

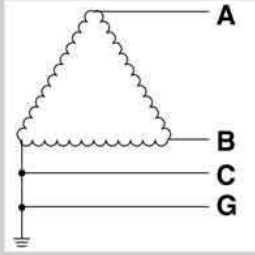
Buy:
[Square D transformers at Amazon](#)

Transformer Configurations

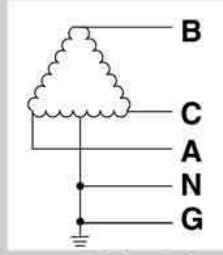
A B C: 3-phase lines N: Neutral G: Ground



Wye



Delta



High-leg delta

Example 3-phase Transformer configuration

Inside each transformer are 2 coils of wire. The primary coil connects to high voltage from utility, and the secondary coil connects to customer service.

Generally, there are three transformers at each 3-phase service. Each swiggly line in illustration represents secondary coil inside transformer. Some transformers have more than 1 primary and 1 secondary

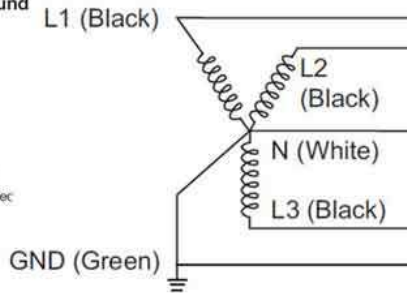
Resource:

[Transformer basics](#)

6. Wye with Neutral + Ground

120V (L-N) / 208V (L-L),
127V (L-N) / 220V (L-L),
277V (L-N) / 480V (L-L),
347V (L-N) / 600V (L-L)
4 Wire Wye + Ground

Common system configuration with Neutral pulled into facility and bonded to ground.



[Larger image](#)

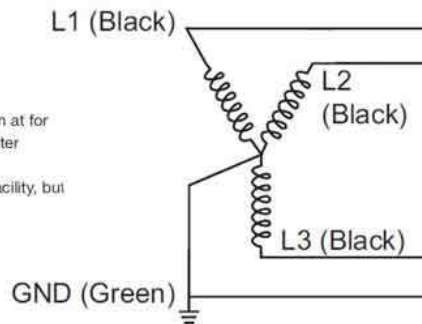
Wye with Neutral and Ground

Shows secondary winding outputs from 3 transformers to panel

5. Wye + Ground

208, 480, 600V (L-L)
3 Wire Wye + Ground

A common MCC configuration at for pumping and water/waste water treatment.
Neutral NOT pulled into the facility, but is bonded to ground.



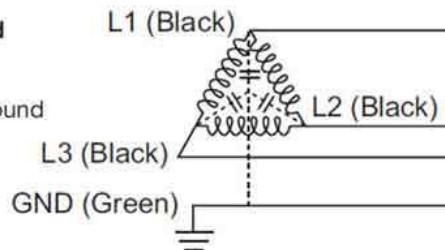
[Larger image](#)

Wye and ground/ no Neutral

Shows secondary winding outputs from 3 transformers to panel

7. Delta + Ground

240, 480V (L-L)
3 Wire Delta + Ground



[Larger image](#)

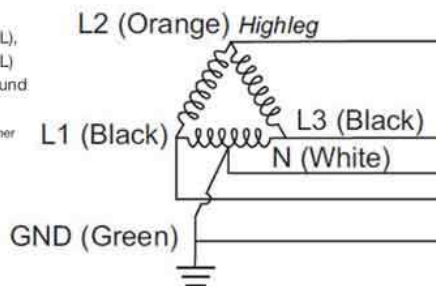
Delta and ground/ No Neutral

Shows secondary winding outputs from 3 transformers to panel

8. Highleg Delta

120V (L1 / L3-N) / 240V (L-L),
240V (L1 / L3-N) / 480V (L-L)
4 Wire Highleg Delta + Ground

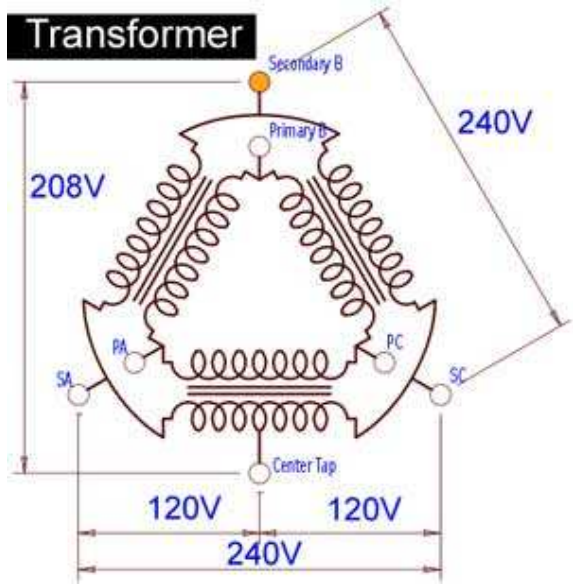
A common system configuration with one "center tapped" transformer winding.
The Neutral is often pulled into facility and is bonded to ground.
The Highleg-to-Neutral voltage is half the Line-Line voltage multiplied by $\sqrt{3}$



[Larger image](#)

High leg Delta/ with ground and Neutral

Shows secondary winding outputs from 3 transformers to panel
High leg uses orange wire




Delta primary coil and High-leg delta secondary transformers

Shows 3 transformers, and shows both primary winding and secondary transformer, plus secondary output potentials that will connect Primary coil (or winding) is connected to 3-phase utility wires Secondary coil is connected to service wires that feed into service Configuration shows Delta primary coil. And High leg delta secondary

If coil inside transformer is wound in Delta configuration, then be made between line and neutral.

The midpoint winding S3 is tapped which gives 120V or 208 v S1 coil on one side of delta and S2 coil on other side of delta c Center tap on S3 coil is used for all 120Volt loads, plus S3 coil causing potential imbalance.

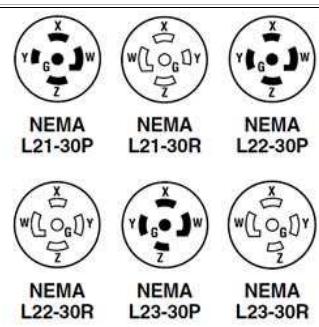
120Volt loads must not exceed 5% of total Kva to preserve balance The wild leg, or Leg B, or Phase B, is illustrated as Secondary the orange wire connects to this leg

High leg wire color is orange. 

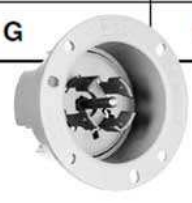
Resources:

[Read wikipedia about high-leg delta](#)

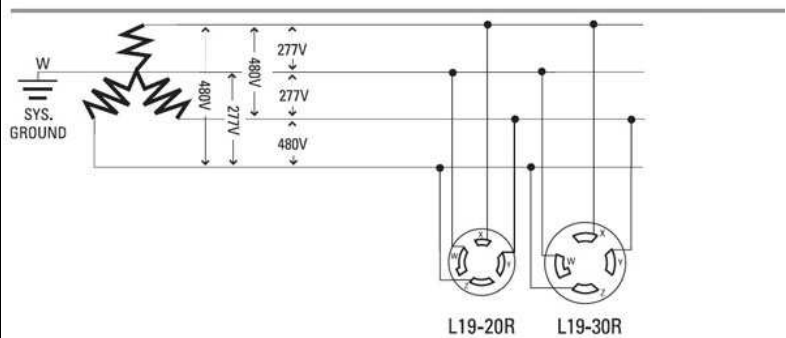
How to wire 3-phase outlets and surge protection



X, Y, Z	Hot Lead
W	Neutral Lead
G	Grounding Lead



4-Pole, 4-Wire Non-Grounding: 3Ø 277/480V



277 480 Three Phase WYE

480 volts across line-to-line

277 volts line-to-neutral

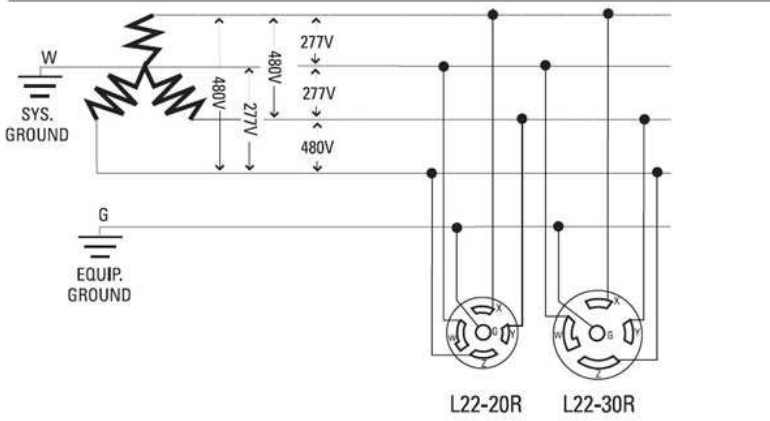
All Wye connections provide two voltages due to the common point or neutral connection.

Line-to-line voltage = 480V
 Line-to-neutral voltage = 277V
 $277 \text{ Volt} \times \sqrt{3} = 479.778 \text{ Volt}$

$\sqrt{3} = 1.7320$

[Larger image](#)

4-Pole, 5-Wire Grounding: 3Ø 277/480V



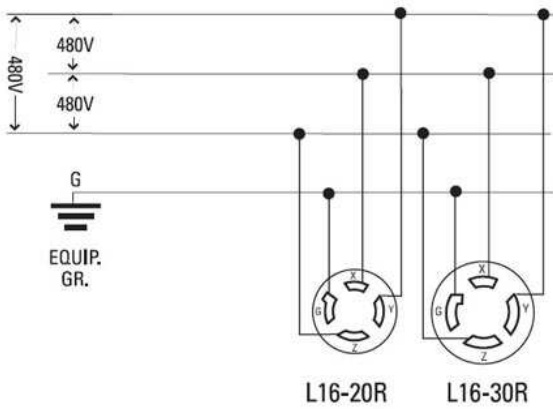
277 480 Three Phase WYE

480 volts across line-to-line
 277 volts line-to-neutral
 Shows equipment ground

[Larger image](#)

[Intermatic 3-phase surge / pdf: AG48013 AG65033](#)

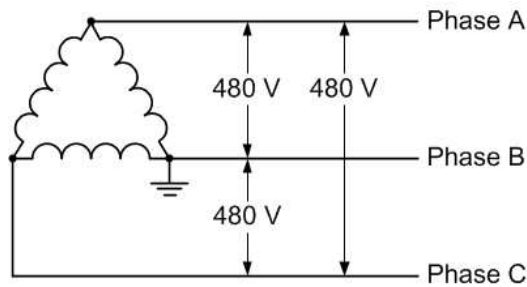
3-Pole, 4-Wire Grounding: 3Ø 480V



Three Phase 480V

480 volts across line-to-line
 No system ground
 Shows equipment ground

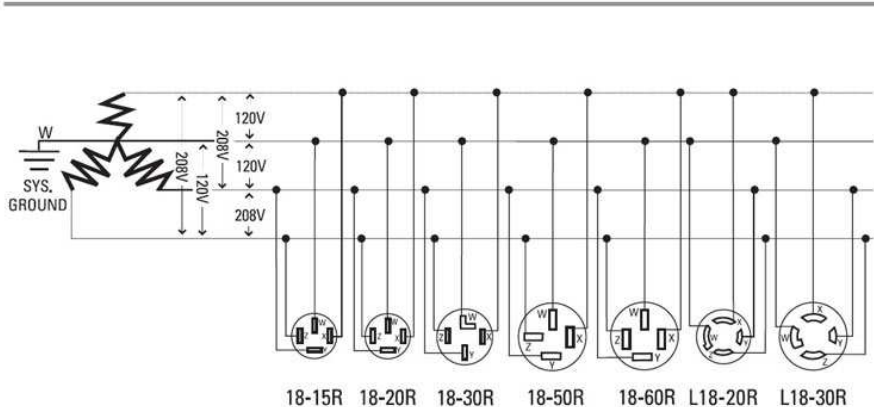
[Larger image](#)



Three Phase 480V delta corner gr

480 volts across line-to-line

4-Pole, 4-Wire Non-Grounding: 3Ø 120/208V

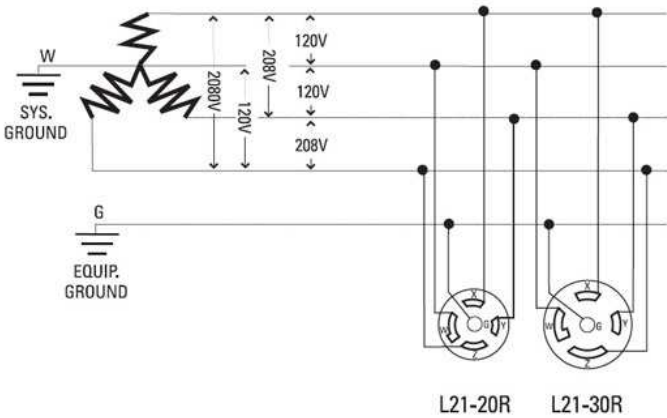


120 208V 3-phase wye

208 volts across line-to-line
 120 volts line-to-neutral

[Larger image](#)

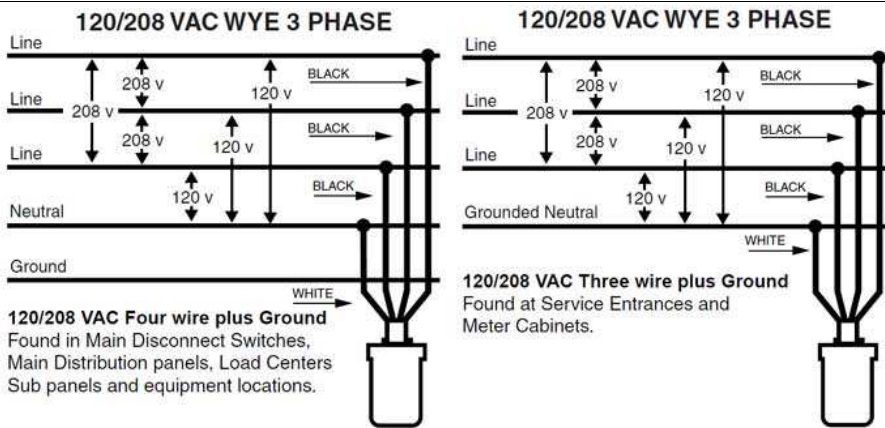
4-Pole, 5-Wire Grounding: 3Ø 120/208V



120 208V 3-phase wye

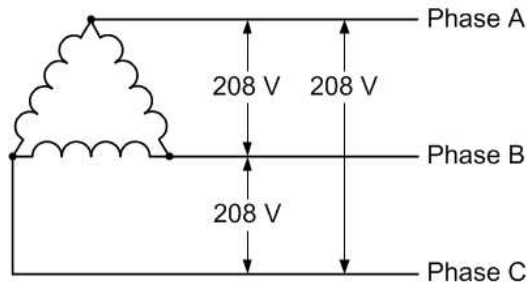
3 phase 4 wire
208 volts across line-to-line
120 volts line-to-neutral
Shows equipment ground

[Larger image](#)



120 208V 3-phase wye

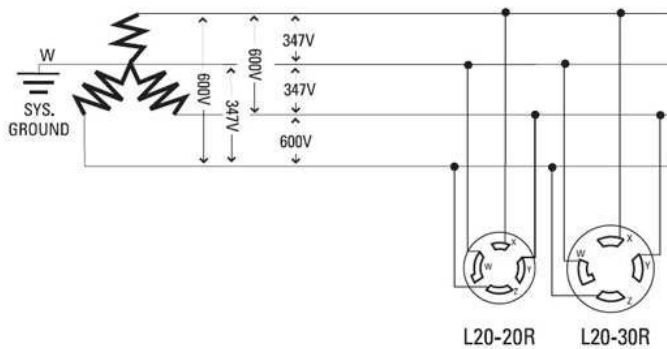
Intermatic AG208C3 Surge



208 Volt 3-wire delta

3 Phase 3 wire 208 No Neutral
Phase to phase 208V

4-Pole, 4-Wire Non-Grounding: 3Ø 347/600V

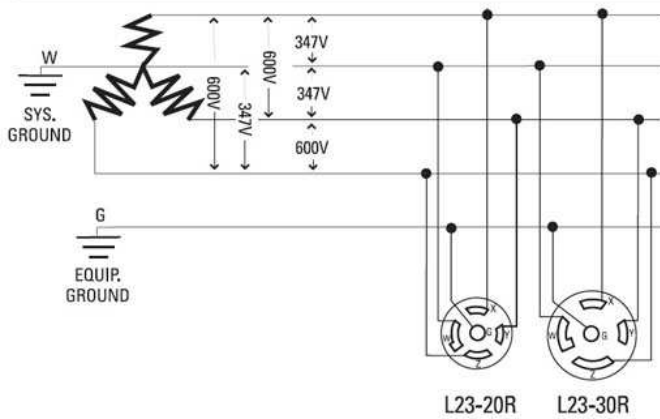


347 600V three phase wye

600 volts across line-to-line
347 volts line-to-neutral

[Larger image](#)

4-Pole, 5-Wire Grounding: 3Ø 347/600V



347 600V three phase wye

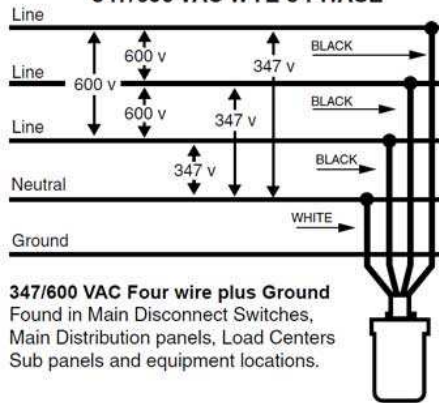
600 volts across line-to-line

347 volts line-to-neutral

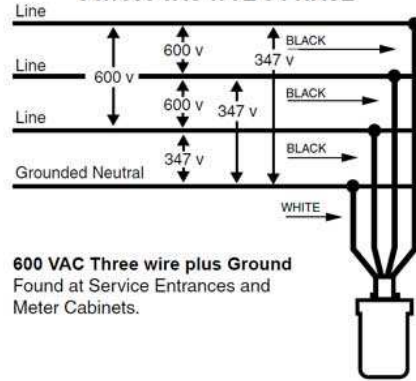
Shows equipment ground

[Larger image](#)

347/600 VAC WYE 3 PHASE



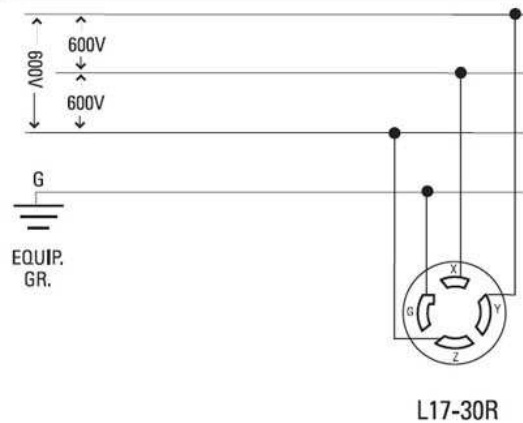
347/600 VAC WYE 3 PHASE



347 600V three phase wye

Intermatic AG65033 Surge Protection

3-Pole, 4-Wire Grounding: 3Ø 600V



Three Phase 600V

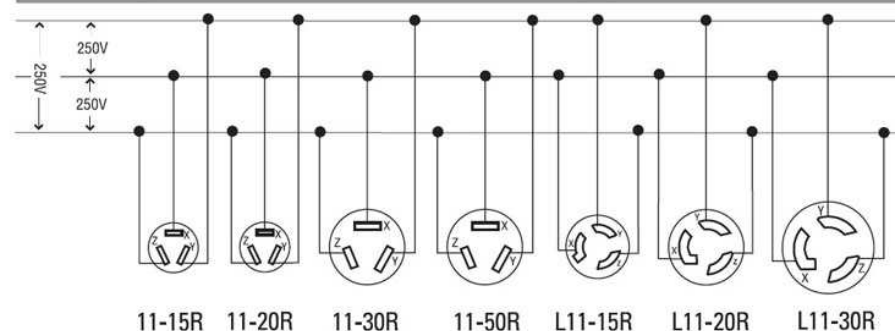
600 volts across line-to-line

No system ground

Shows equipment ground

[Larger image](#)

3-Pole, 3-Wire Non-Grounding: 3Ø 250V



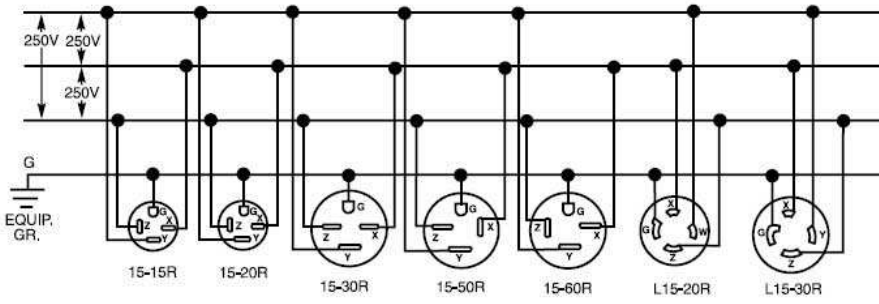
Three phase 250V

250V across each line

No ground

[Larger image](#)

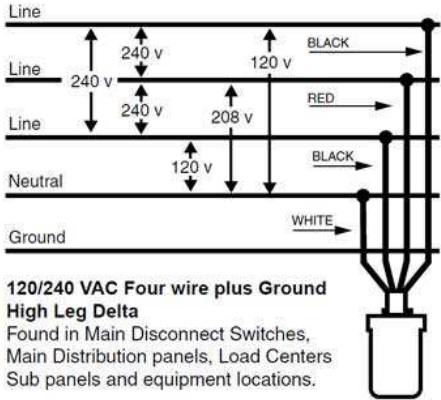
3ø250V



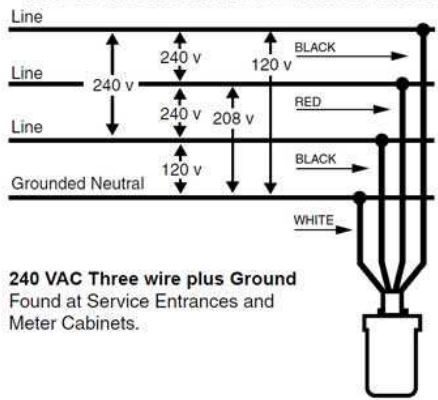
Three phase 250V

250V across each line
With ground

120/240VAC HIGH LEG DELTA 3 PHASE



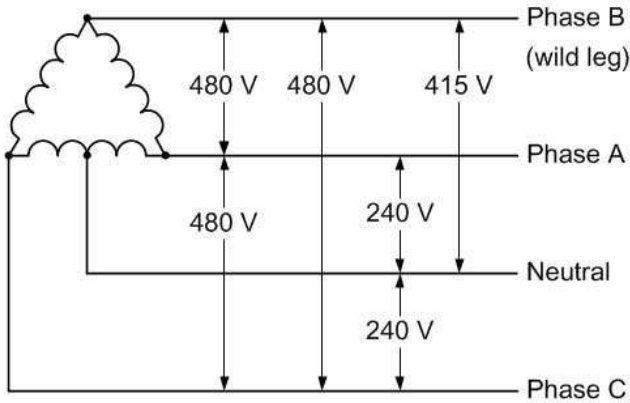
120/240VAC HIGH LEG DELTA 3 PHASE



120-240 High leg Delta

Intermatic AG2403C3 surge protection

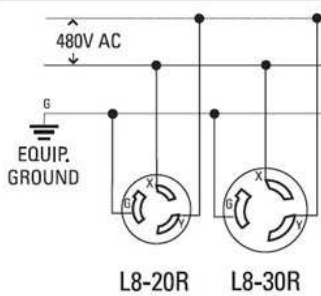
Black Line to Black Line 240V
Black Line to Neutral 120V
Red or Orange Line to Neutral 208V



240-480 High leg Delta

Phase to phase 480V
Phase A Phase C to Neutral 240V
Phase B high leg to Neutral 415V
Voltages are doubled compared with 120-240 high leg

2-Pole, 3-Wire Grounding: 480V AC

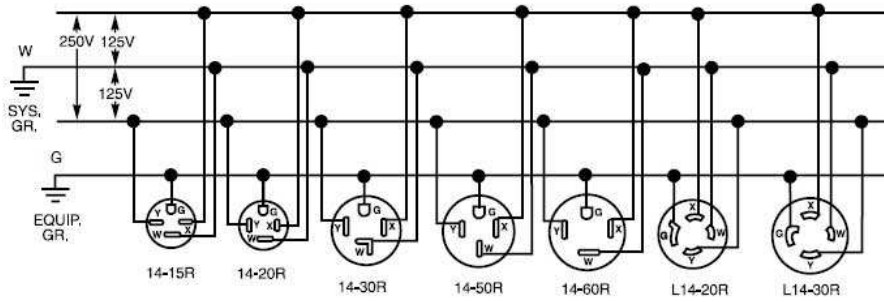


277 480 Volts Single phase

With equipment ground

[Larger image](#)

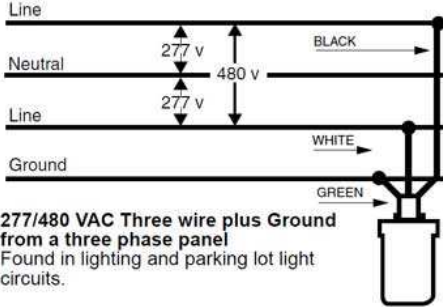
125V/250V



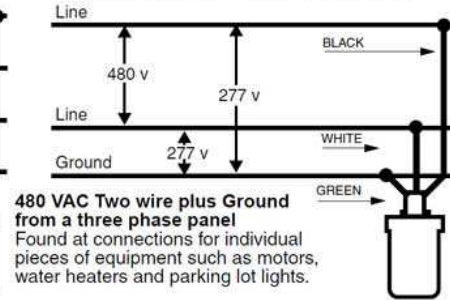
125 250 Volts Single phase

With equipment ground

277/480 VAC SINGLE PHASE



277/480 VAC SINGLE PHASE



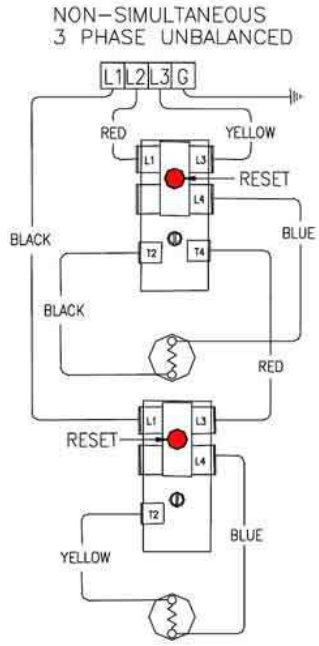
277 480 Volts Single phase

Intermatic AG48013 Surge

KW	Phase	Recommended Over Current Protection Rating				Wire Gauge							
		208 v	240 v	277 v	480 v	C=copper wire; A=aluminum wire							
						208 v		240 v		277 v		480 v	
C	A	C	A	C	A	C	A	C	A				
6	1	40	35	30	20	8	8	10	8	10	10	14	12
	3	25	20	X	15	12	10	14	12	X	X	14	12
9	1	60	50	45	25	6	4	8	6	8	6	12	10
	3	35	30	X	15	10	8	10	10	X	X	14	12
12	1	80	70	60	35	4	2	4	3	6	4	10	8
	3	45	40	X	20	8	6	8	8	X	X	14	12
15	1	90	80	70	40	3	2	4	2	4	3	8	8
	3	60	50	X	25	6	4	8	6	X	X	12	10
18	1	110	100	90	50	2	1/0	3	1	3	2	8	6
	3	70	60	X	30	4	3	6	4	X	X	10	10
24	1	150	125	110	70	1/0	3/0	1	2/0	2	1/0	4	3
	3	90	80	X	40	3	2	4	2	X	X	8	8
27	1	175	150	125	80	2/0	4/0	1/0	3/0	1	2/0	4	2
	3	100	90	X	45	3	1	3	2	X	X	8	6
30	1	200	175	150	80	3/0	250	2/0	4/0	1/0	3/0	4	2
	3	100	90	X	45	2	1/0	4	2	X	X	8	6
36	1	225	200	175	100	4/0	300	3/0	250	2/0	4/0	3	1
	3	125	110	X	60	1	2/0	2	1/0	X	X	6	4
45	1	300	250	225	125	350	500	250	350	4/0	300	1	2/0
	3	175	150	X	70	2/0	4/0	1/0	3/0	X	X	4	3
54	1	350	300	250	150	500	700	360	500	250	350	1/0	3/0
	3	200	175	X	90	3/0	250	2/0	4/0	X	X	3	2

[Larger image](#)

3-phase Wire and Breaker size ch



[Larger image](#)

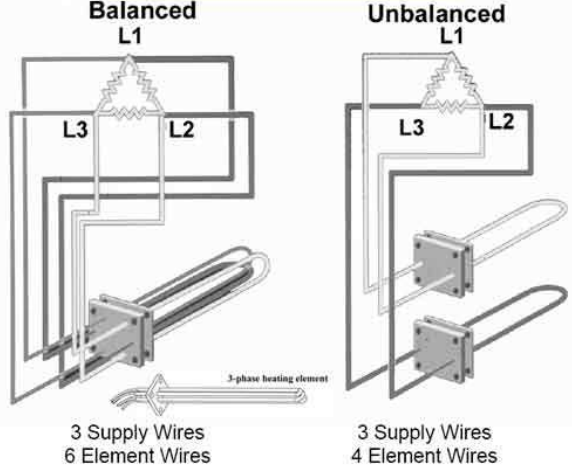
Wire water heater for 3-phase non

Unbalanced
Both elements are never ON at same time.
Always use ECO-protected thermostat on upper and lower
Elements will heat with any applied voltage
Each element has volts and watts listed on side.
Volts squared divided by watts = correct ohm rating to

Resources:

[Wiring diagrams and information about 3-phase water](#)

3-Phase water heater wiring



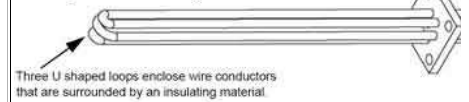
[Larger image](#)

Balanced and unbalanced element

3 phase water heater elements
Balanced means equal draw across all three Hot legs in
Unbalanced draws power from 2 legs for one element
constantly ON when thermostat calls for demand. Other
on upper/lower element.

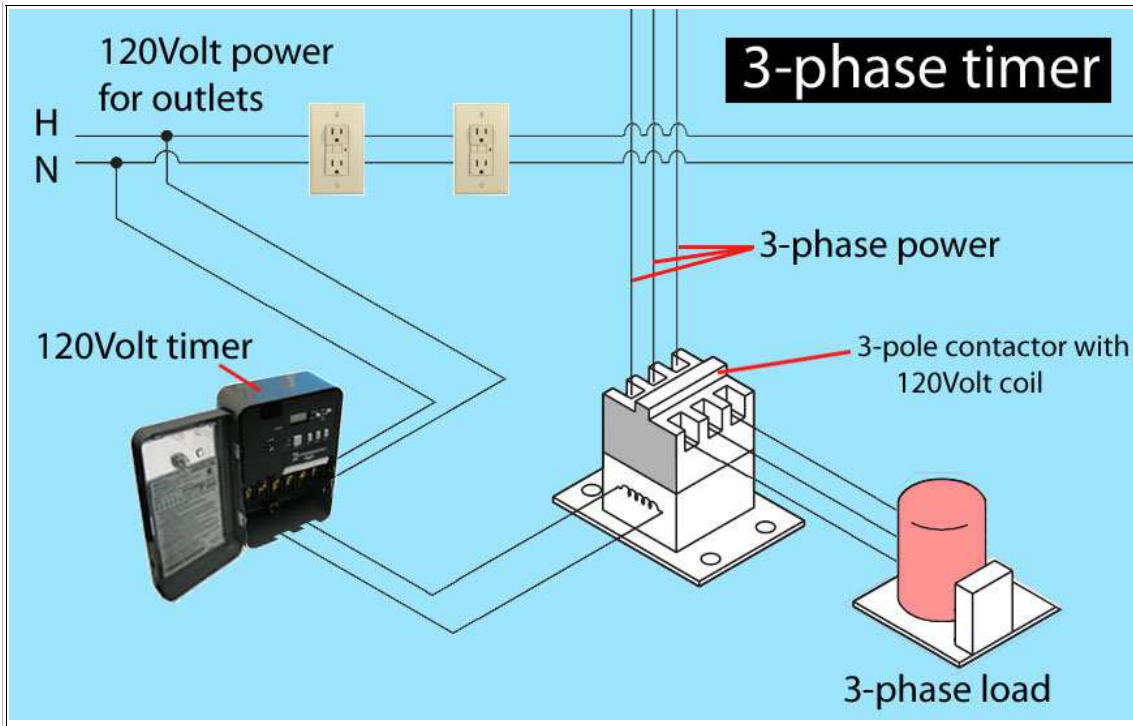
Balanced heat element has 6 wires, and 3 heating loops
Elements will heat with any typical voltage

3-phase heating element



[3-phase electric water heater service manual](#)

How to wire 3-phase timer

































Buildings with 3-phase power ordinary 120Volt o

- 1) Use 120 Volt timer.
- 2) Install 3-pole contactor
- 3) Timer controls 120Volt
- 4) 3-pole contactor turns :

More resources and diag
[How to wire 3-phase time](#)

Additional links:

 EJ500	 Utilitec	 Tork	 ST01C	 ETW350	 Aube
 Water heater	 GE	 Leviton	 Hagar	 Wood	
			 Timex	 Countdown	
 Intermatic trippers and parts	 Dayton	 Power pack			
 Sylvania timers	 Tork timers and manuals	 Paragon timers and manuals			 Westinghouse
 How to set analog timers	 Westinghouse timers Timex timers Brinks timers	 Gardena timers			
 Wire GE 15207 timer	 GE box timers				 Intermatic
 Intermatic T1906 and T1905	 Intermatic T-101 T103 T104	 Intermatic EH40 and WH40			 Troubleshooting

[Intermatic sprinkler timers](#)



[Intermatic pool timers and manuals](#)



[Intermatic timers](#)



[How to wire Intermatic GM40](#)

[How to wire Tork DTU40](#)



Intermatic CA3750
Wireless contactor

[Control water heater](#)



Gas water heaters

Electric water heaters

Hybrid

Support the economy:

Buy water heaters from my associate links:

[50 gallon Gas water heaters at Amazon](#)

[40 gallon gas water heaters at Amazon](#)

[50 gallon Electric water heaters at Amazon](#)

[40 gallon electric water heaters at Amazon](#)

[Hybrid / heat pump/ water heaters at Amazon](#)

Resources:

[How to install gas water heater](#)

[How to install electric water heater](#)

[Troubleshoot gas water heater](#)

[Troubleshoot electric water heater](#)

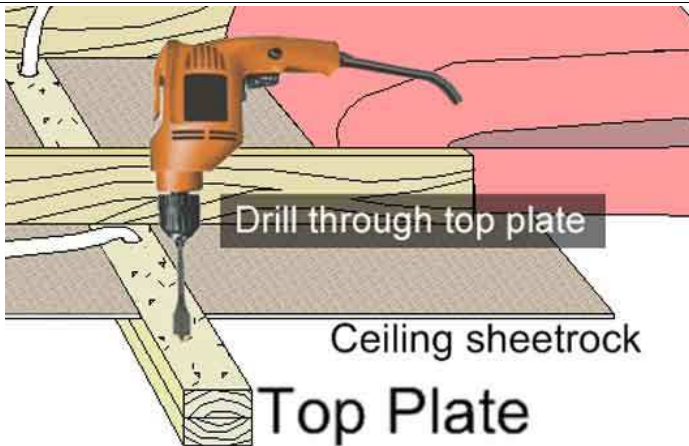
[Point of use water heaters](#)



[Industrial electric at Amazon](#)

[Industrial supplies at Amazon](#)

[Industrial and scientific Amazon](#)



Drill through top plate

Ceiling sheetrock

Top Plate

Tools

[Shop Amazon - DEWALT](#)

[Shop Amazon - Black and Decker](#)

[Shop Amazon - Stanley Tools](#)

[Shop Amazon - SKIL Tools](#)

[Shop Amazon - Porter-Cable Tools](#)

[Shop Amazon - Bosch Tools](#)

[Shop Amazon saws and saw blades](#)



Box timers

Intermatic 240V EH40 Tork 120V-240V Indoor-outdoor GE 15132 120V-240V Indoor-outdoor GE 1507 120V-240V Intermatic 240V WH40 Intermatic T704 240V Intermatic T104 240V indoor-outdoor Tork DTU40 120-240V indoor-outdoor

[Compare box timers](#)

[Control water heater w/ Z-wave](#)



[Control centers:](#)

[+ manuals and parts](#)

[All control centers and parts](#)

Including Z-wave

	<p>Compare programmable timers</p> <p>Control water heater with programmable wall timer</p>
	<p>Compare countdown timers</p> <p>Control water heater with countdown timer</p>
	<p>Low voltage transformers</p>

E-mail: geno03245w@gmail.com

My response might end up in spam folder, check email folders

[Site map](#)

[Follow newest idea on twitter](#)

[Privacy policy](#)

[Search](#)

