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<b>Document number</b>	MCW-SDS-001
<b>Revision</b>	0.1
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<b>Product</b>	MCW Star Delta Starters

<b>Title</b>	MCW Star Delta Starter Motor Connection Information
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<b>Summary</b>	This document gives information on connecting the motor terminals to the MCW star delta starter. It also gives information on the thermal overload trip class.
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A star delta starter can only be used with motors which have 400V delta and 690V star windings.

They cannot be used with motors that have 200V delta and 400V star windings (unless the mains supply is 200V 3 phase and the star delta starter is designed to work with this input voltage).

A star delta starter will have 3 contactors:

- Main contactor
- Star contactor
- Delta contactor

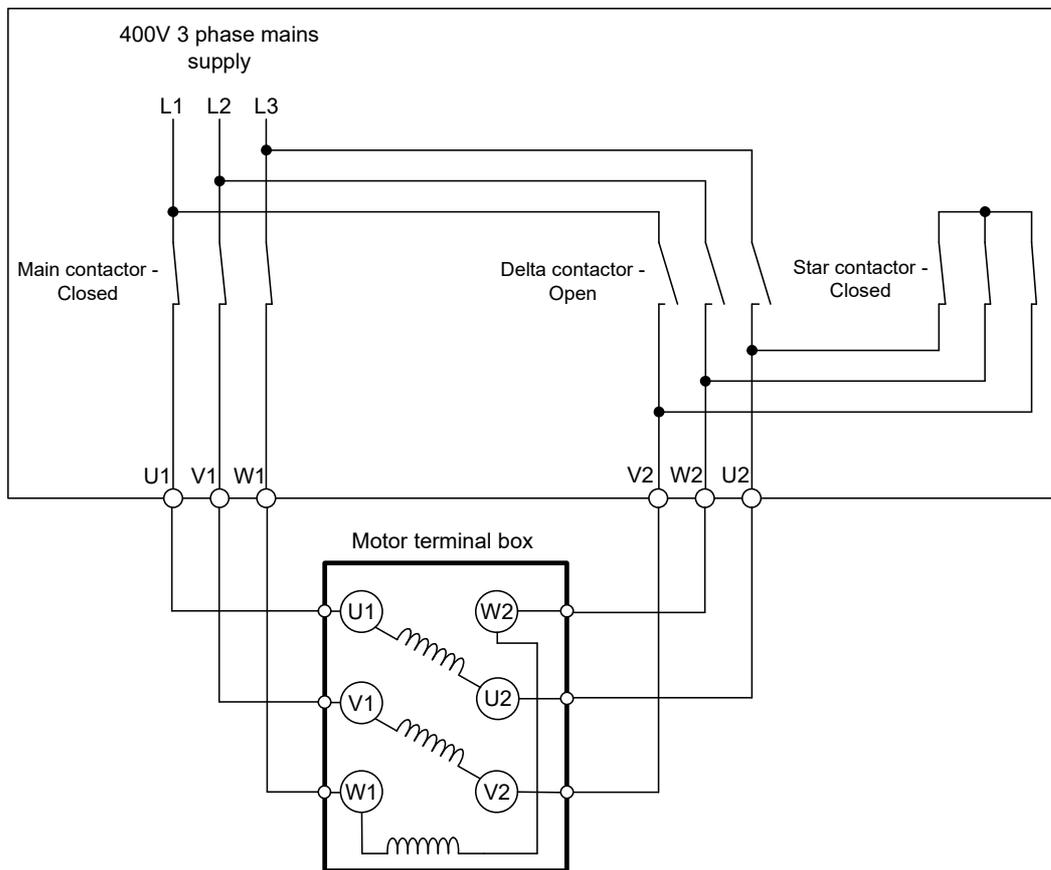
When the start button is pressed on the control panel, the control system will close the main and star contactors.

After a time has elapsed, controlled by the timer on top of the main contactor, the star contactor will open and the delta contactor will close.

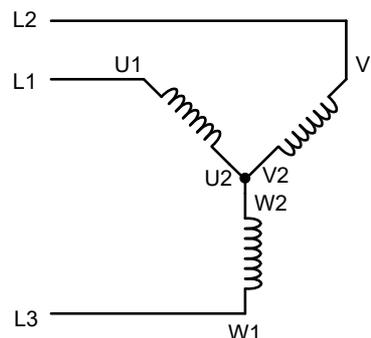
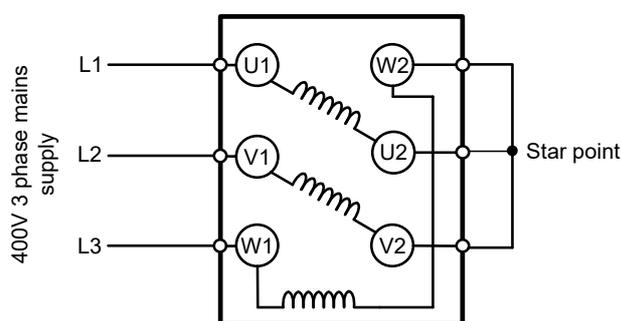
**Note:** With the connections as described below, the motor will rotate in the forward direction of rotation.

## Circuit diagram with Main and Star contactors closed

This is equivalent to connecting the motor in the star 690V configuration. This is the start configuration for the motor. This configuration draws less current from the mains supply during starting then if the motor was started in the delta (400V) configuration.



Equivalent to -

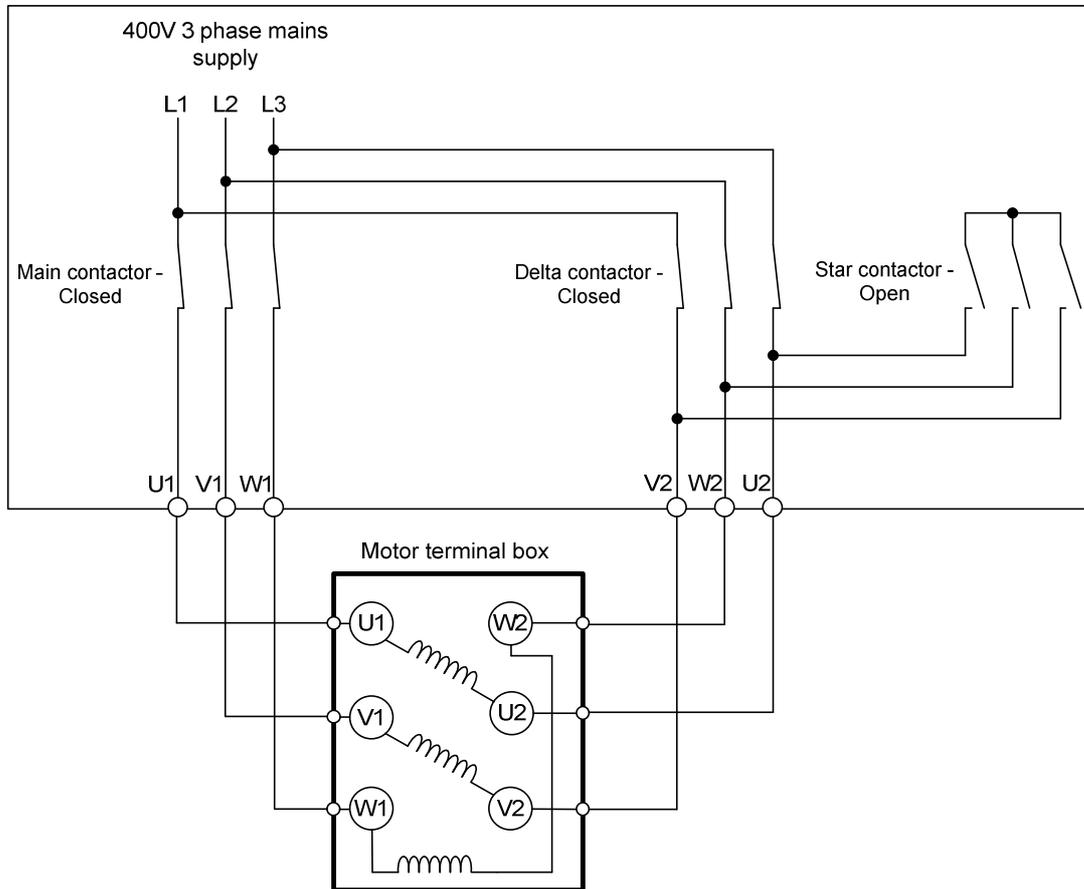


**NOTE:** The above 'Equivalent to' diagrams just give information on how the motor would be connected to a 3-phase supply if the motor was connected in the 'star' configuration

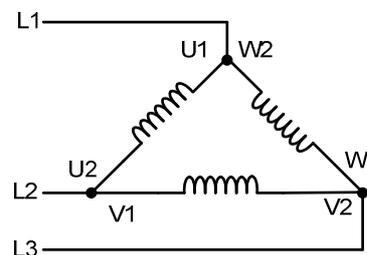
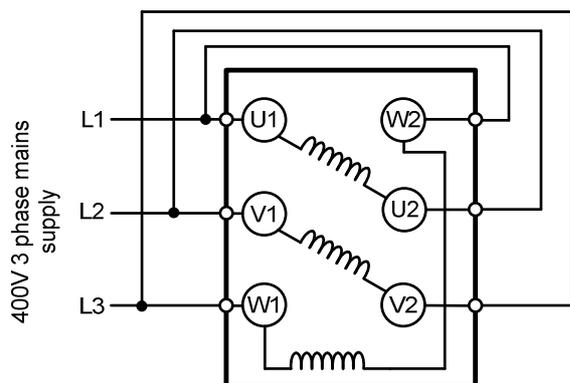
**NOTE:** Please remember to remove the shorting bars from the motor terminals as these are not required with a star-delta starter.

## Circuit diagram with Main and Delta contactors closed

This is equivalent to connecting the motor in the delta 400V configuration. The delta connection is the running connection for the motor.



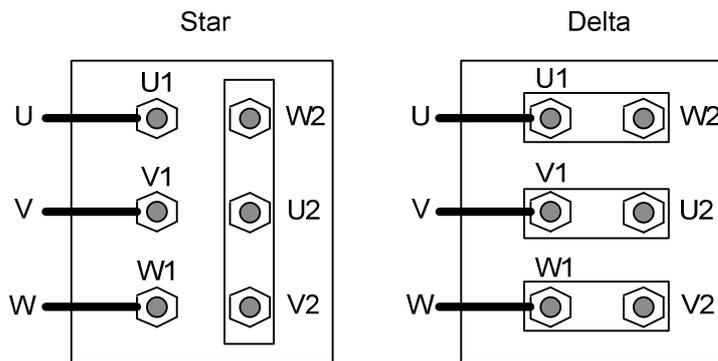
Equivalent to -



**NOTE:** The above 'Equivalent to' diagrams just give information on how the motor would be connected to a 3-phase supply if the motor was connected in the 'delta' configuration

**NOTE:** Please remember to remove the shorting bars from the motor terminals as these are not required with a star-delta starter.

## Standard motor terminal box connections for star and delta



### Star Delta Starter Trip Class

The MCW star delta starter is fitted with a **Trip Class 10** thermal overload relay which is suitable for the majority of light to medium industrial type load applications.

The class number indicates the trip characteristics from cold state.

$I_r$  = Current setting of overload relay. This should be the Full Load Current (FLC or FLA) shown on motor rating plate.

	$1.05 \times I_r$	$1.2 \times I_r$	$1.5 \times I_r$	$7.2 \times I_r$
	<b>Time to trip from a cold start</b>			
<b>Class 10</b>	>2 hours	<2 hours	<4 minutes	2s< to <10s

Trip Class 10 applications are low or medium starting load applications.

They are not suitable for applications that have a heavy load on start that takes greater than 10s to start or very high inertia loads such as high inertia fans, centrifuges and loaded crushers.

## Trip Class Application Examples

Application	Trip Class
Agitator	10
Compressor - Centrifugal	20
Compressor - Reciprocating	20
Compressor – Rotary screw	20
Compressor – Rotary vane	10
Compressor - Scroll	10
Ball mill	20
Centrifuge	30
Bow thrusters – Zero pitch	10
Bow thrusters - Loaded	20
Conveyor - Unloaded	10
Conveyor - Loaded	20
Crusher	30
Fan – Low inertia	10
Fan – High inertia	30
Feeder - Screw	10
Grinder	20
Hammer mill	20
Lathe machine	10
Mills – Flour etc.	20
Mixer - Unloaded	10
Mixer - Loaded	20
Molding machine	10
Pelletiser	20
Plastics & textile machines	10
Press, flywheel	20
Pump – Submersible centrifugal	10
Pump – Submersible rotodynamic	10
Pump – Positive displacement reciprocating	20
Pump – Positive displacement rotary	20
Pump jack	20
Rolling mill	20
Roots blower	20
Saw - band	10
Saw - circular	20
Screen - vibrating	20
Shredder	30
Tumblers	10
Wood chipper	30

## Schneider Type D Circuit Breaker Curve

The following graph shows a typical circuit breaker tripping characteristic curve. The left hand curve is the hot characteristic when the breaker is hot. The right hand curve is the cold characteristic when the breaker is cold.

### C120H D curve

