



www.motorcontrolwarehouse.co.uk

| | |
|------------------------|-------------------------|
| Document number | MCW-SDS-002 |
| Revision | 0.0 |
| Author | Gareth Lloyd |
| Product | MCW Star Delta Starters |

| | |
|--------------|----------------------------------|
| Title | Star Delta Starter Fault Finding |
|--------------|----------------------------------|

| | |
|----------------|---|
| Summary | This document gives information on fault finding on star delta starters |
|----------------|---|

NOTE: For clarity, the thermal overload relay has been omitted from the diagrams in this document.

If the motor doesn't start when using a star delta starter, firstly check that the main fuses/circuit breaker or control circuit breakers are OK or in the ON position and the correct voltage on the input of the main contactor.

Check the control and power connections to make sure cables haven't become dislodged and all connections are tight.

If the fuses/circuit breaker/voltage/connection is OK, the next thing to check is the correct connections between the star delta starter and motor.

Problem 1

The motor starts when the star delta starter is in the star configuration but then stops when the star delta starter switches over to the delta configuration.

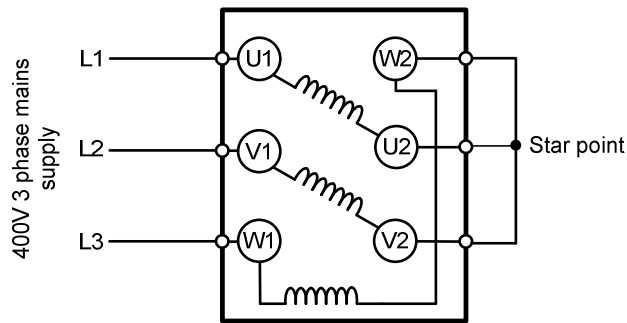
Problem 2

The motor starts when the star delta starter is in the star configuration but runs rough when the star delta starter switches over to the delta configuration.

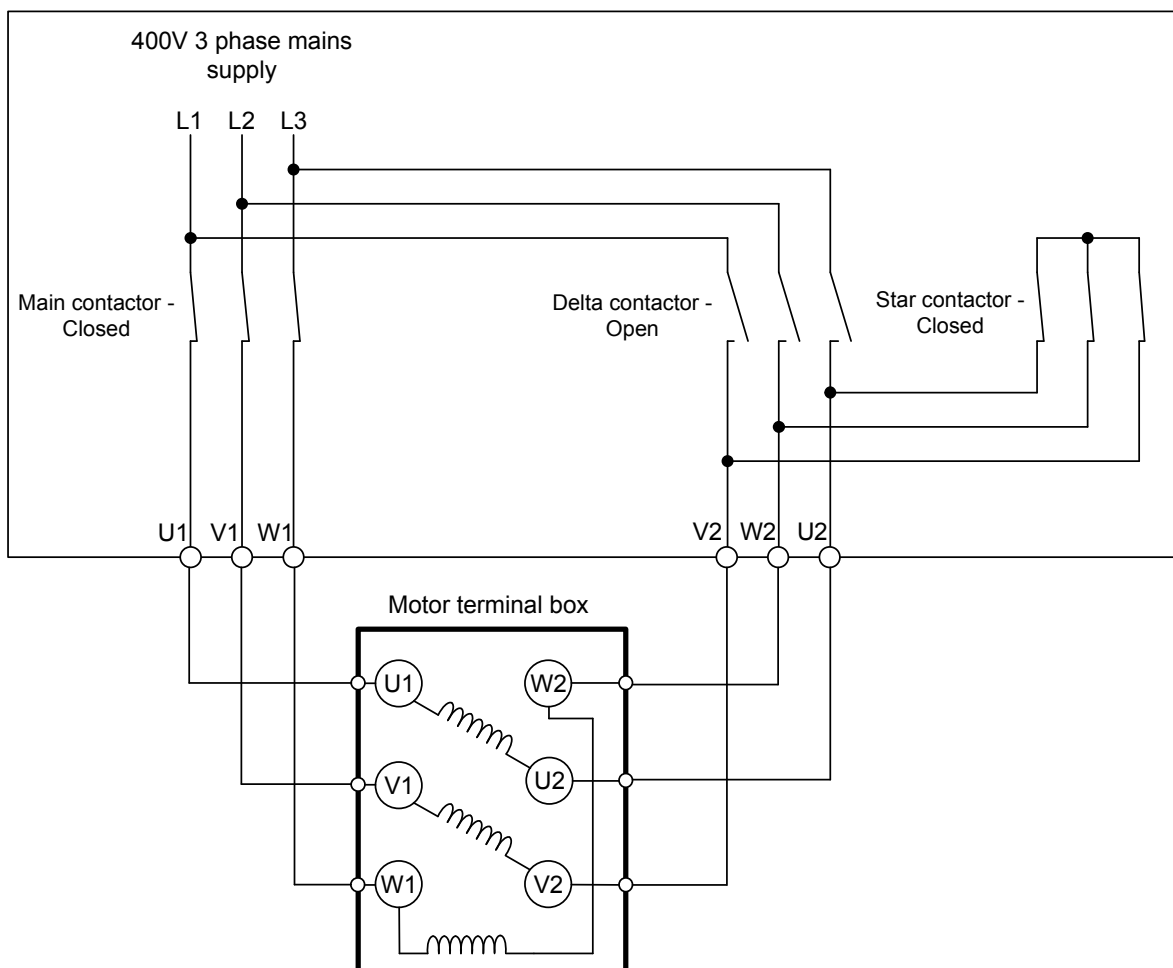
These issues are normally caused because the motor phases are not connected in the correct sequence to the star delta starter terminals.

When the star delta starter is started, 400V is applied to U1, V1 and W1 and U2, V2 and W2 are short circuited together – star connection. See diagram below. Usually as long as 400V 3 phase is applied to the motor and there isn't an issue with the motor, the motor will run. If the phase sequence of U1, V1 and W1 is incorrect, the motor may run in the wrong direction. The phase sequence on U2, V2 and W2 does not matter in star as long as they are all shorted together.

Star connected motor



Star delta starter – star connection

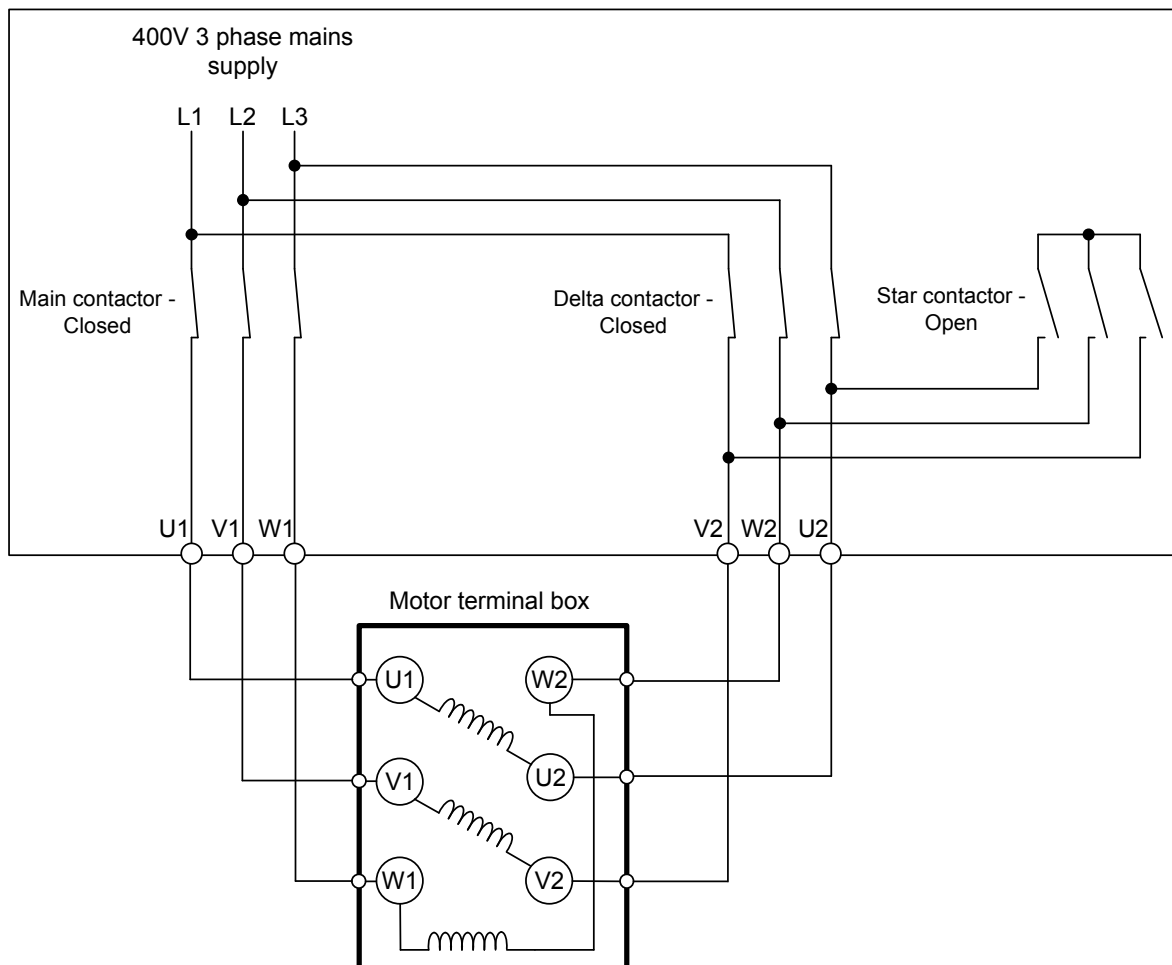


When the star delta starter switches over to the delta configuration, if the phase sequence of the motor connections is wrong, the motor will stop or run rough.

It is important to connect the star delta starter and motor correctly so that each motor phase is across 2 phases of the supply and the start and finish of the motor winding goes to the correct phase of the supply.

The Motor Control Warehouse star delta starter terminals should be in the sequence as in the diagram below. The motor phases should be connected as the diagram below.

Star delta starter – delta connection



Problem 3

Thermal overload tripping

It is important that the trip class of the star delta starter thermal overload is correct for the application. If the trip class is incorrect, this can cause the thermal overload to trip during starting.

Trip class 10 – light to medium industrial loads

Trip class 20 – medium to heavy industrial loads

Trip class 30 – heavy industrial loads

Also the number of starts per hour can influence the correct choice of thermal overload. The higher the number of starts per hour, the higher the trip class of overload required.

Even if the correct choice of thermal overload has been made for the application, the thermal overload may trip during commissioning if the star delta starter is started and stopped more times than would be normal for the application.

Problem 4

Motor doesn't get up to speed in the star configuration and when the star delta starter changes to delta, the thermal overload trips

With some very high inertia applications (fans) when the star delta starter starts the motor in the star configuration, there isn't enough torque in the motor to get the motor up to speed. The motor may run at a 1/4 or 1/3 base speed in the star configuration due to the lack of torque. Therefore when the star delta starter changes to the delta configuration, there is a large inrush of current that lasts for a long time while the motor tries to get up to speed.

If a trip class 10 thermal overload has been used on this type of application, the thermal overload may trip while the motor is trying to get up to speed.

In this instance, the star delta starter and thermal overload should be up-rated to trip class 20 or trip class 30.

Problem 5

If the star delta starter doesn't start when the start button is pressed or if a contactor doesn't pull in when expected, potentially there could be a faulty components within the star delta starter.

With **power removed** and the supply **locked off** from the star delta starter, check:

- The E-Stop button contacts are closed when the E-Stop button is released
- The thermal overload is reset and the connection between terminals 95 and 96 is closed
- The contactor coils are OK. Measure between A1 and A2 on each contactor to make sure there is a low coil resistance