

Qstart Compact Enclosed Star-Delta Starter User Guide

(5.5kW~15kW)



V2.1.2

Contents

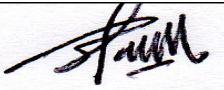
1 Safety information	1
2 Technical Data	2
3 Supply & Motor Connection & Circuit Diagrams	4
4 Operation	7

Declaration Of Conformity

Willpower Electrical Ltd trading as Motor Control Warehouse hereby states that the Q-Start Compact star delta starter range QSTART055EN400V to QSTART15EN400V conforms to the relevant safety provisions of the **Low Voltage Directive 2006/95/EC** and the **EMC Directive 2004/108/EC** and have been designed and manufactured in accordance with the following harmonised European standards:

EN61000-6-2	EMC immunity in industrial environment
EN61000-6-4	EMC emission in industrial environment
EN61010-1	Safety
EN60529: 1992	Specifications for the degrees of protection provided by enclosures

Model	kW Rating	Input Voltage
QSTART055EN400V	5.5kW	380-440V
QSTART075EN400V	7.5kW	380-440V
QSTART11EN400V	11kW	380-440V
QSTART15EN400V	15kW	380-440V

Signed	
Position	Director
Date	20.03.2018

Safety Information

This chapter provides very important information so that you can use the **Qstart Enclosed Star-Delta Starter** safely, prevent injury or death, or damage to equipment.

Please read this information thoroughly and make sure you observe all the safety information shown below and elsewhere in this manual. Please make this User Guide available for the end user.

Safety symbols



Danger: Danger of electrical shock which can cause injury or death, or damage to equipment



Warning: Potential hazard, other than electrical, that can cause physical injury or damage to equipment



Danger

- The Qstart Enclosed Star-Delta Starter should **ONLY** be installed, commissioned and maintained by qualified and competent personnel.
- The Qstart must be installed to the latest IEE wiring regulations taking into account local regulations.
- Before power is applied to the Qstart, ensure the Qstart lid is fixed in place.
- Dangerous voltages are present when the input power supply is connected to the Qstart. Before attempting any work on the Qstart cubicle or motor, isolate and lock off the input power supply. Prove dead using a voltage tester. The voltage tester itself should be proved immediately before and after testing using a proving unit with a low power output.
- The Qstart cubicle must be connected to system ground using the cubicles earth terminals. The size of the earth conductor and earth loop impedance must comply with national and local electrical regulations.
- The Qstart is a non-field repairable unit. Contact the supplier of the Qstart.
- The Qstart cubicle has internal MCBs/Fuses to protect the Qstart wiring. The supply to the Qstart cubicle must be protected by suitable rated fuses/MCB.



Warning

- All machinery, in which this Qstart is used, within the European Union, must comply with directive 98/37/EC, Safety of Machinery.
- Do not install the Qstart in an explosive environment.
- The motor must be used within the manufacturers guidelines.
- Do not allow conductive material to enter the components within the Qstart, e.g. from drilling during installation.
- If the Qstart external start circuit is used, the external start contact **MUST** be a momentary contact and **NOT** a latching/stay-put contact.
- **The Key Release Emergency Stop Button on this equipment (if fitted) gives a 'category zero stop' (coast to stop). It is a low integrity level, PLa system. Therefore a single fault can lead to a loss of the safety function. Please check this is adequate for your machine/equipment.**

Technical data

Model	kW rating	Input phase	Input voltage (VAC)	Max allowed motor current (A)	Motor current (A) (overload range) Trip class 10	Overload range (A)	Typical Motor (A)
QSTART055EN400V	5.5	3	400	13.8	9.5 to 13.8	5.5 to 8	11.5
QSTART075EN400V	7.5	3	400	17	12 to 17	7 to 10	15
QSTART11EN400V	11	3	400	22.5	15.5 to 22.5	9 to 13	18
QSTART15EN400V	15	3	400	31	29.3 to 43.1	17 to 25	27

NOTE: The thermal overload setting is set to minimum as default. It should be adjusted to suit the motor used.

To calculate the thermal overload setting = Actual motor nameplate current ÷ 1.7 X 1.1 (10% safety margin to prevent spurious tripping).

NOTE: Starting the motor more than once every 10 minutes will alter the thermal overload tripping characteristic by heating the current sensing elements, making the overload trip more quickly for a given setting.

NOTE: The Qstart enclosure has internal MCBs to protect the Qstart control wiring. The mains supply to the Qstart enclosure must be protected by suitably rated fuses/MCB.

The Qstart does not have a mains supply MCB or a mains isolator, this must be provided by the end user.

Approvals	CE approval	CE
Environment	Altitude	1000m rated 1000m~3000m, 1% rated current de-rating per 100m above 1000m
	Operating Temperature	-10°C~+45°C
	Max. Humidity	≤90%RH, non-condensing
	Vibration	≤5.9m/s ² (0.6g)
	Storage Temperature	-40°C~+70°C
	Running Environment	Non-flammable, No corrosive gasses, no contamination with electrically conductive material
Supported Power Supply Systems		TT & TN
Qstart Enclosure		IP65
Input supply frequency		50 to 60Hz
Input supply voltage		3 phase 400VAC ±10%
Breaking capacity of protective devices		10kA
*Contactor coil voltage		400VAC/240VAC/110VAC (+/-10%)

*Model dependant

Qstart Cubicle Dimensions

Model	Dimensions (H x W x D) Trip	Weight (kg)
QSTART055EN400V	270 x 270 x 180	4.9
QSTART075EN400V	270 x 270 x 180	4.9
QSTART11EN400V	270 x 270 x 180	4.9
QSTART15EN400V	270 x 270 x 180	4.9

Qstart Trip Class

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

The MCW Enclosed Qstart star delta starter range are not suitable for applications that have a very heavy load on start that takes greater than 10s to start or very high inertia loads such as high inertia fans, centrifuges or loaded crushers.

Starting the MCW Qstart Enclosed star delta starter more than once every 10 minutes will alter the thermal overload tripping characteristics making the overload trip more quickly for a given thermal overload current setting.

Trip Class Explained

At 600% of the maximum current rating of the motor the **Trip Class 10** unit will trip in 10 seconds or less, **Trip Class 20** will trip in 20 seconds or less, and **Trip Class 30** will trip in 30 seconds or less.

The class number indicates the thermal overload 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 x I_r	1.2 x I_r	1.5 x I_r	7.2 x I_r
	Time to trip from a cold start			
Trip Class 10	>2 hours	<2 hours	<4 minutes	2s< to <10s

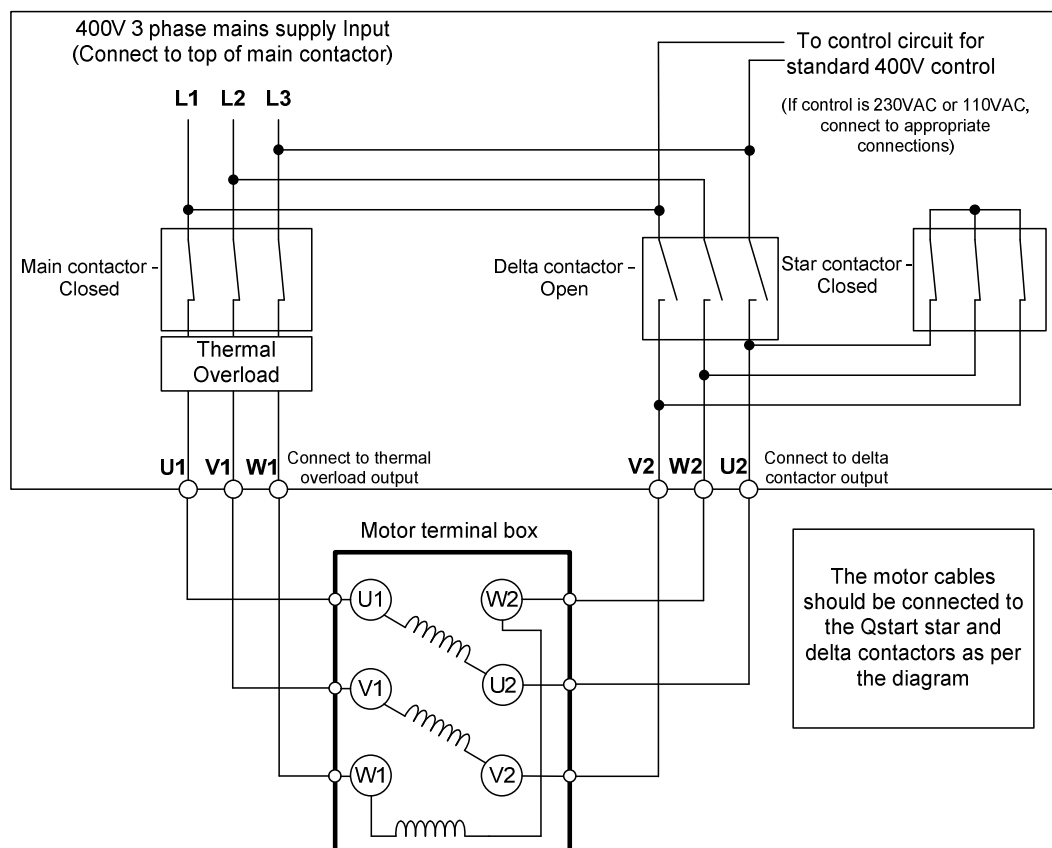
NOTE:

The Qstart enclosed star delta starter can only be used with motors which have 400V delta and 690V star windings.

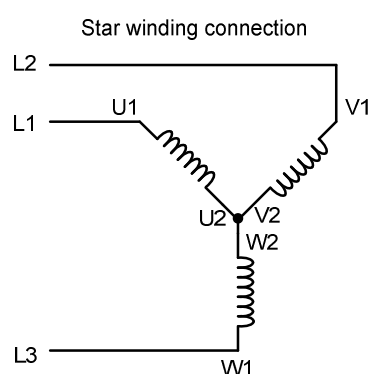
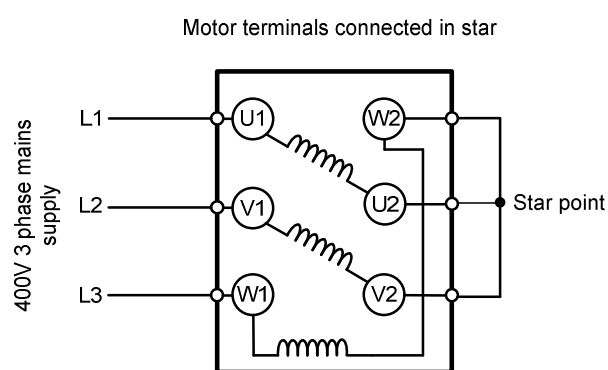
They cannot be used with motors that have 200V delta and 400V star windings.

Qstart 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 configuration. Please connect to the motor as per this top diagram.



Equivalent to -

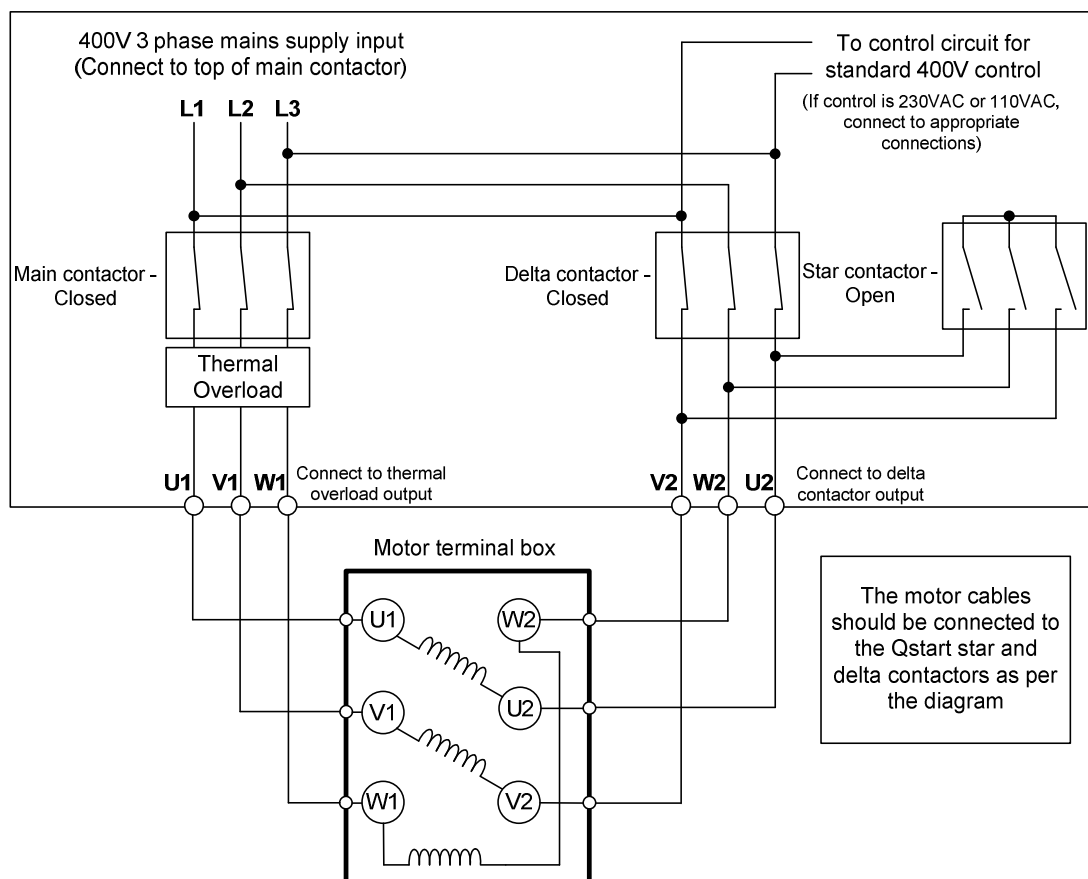


NOTE: The above 'Equivalent to' diagrams just give information on how the motor would be connected to a 3-phase supply if the motor was connected in the 'star' configuration

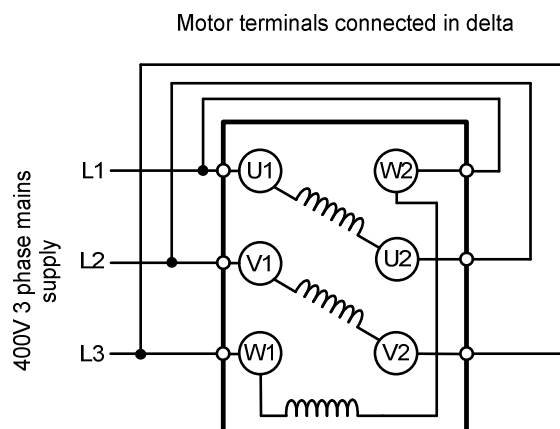
NOTE: Please remember to remove the shorting bars from the motor terminals as these are not required with a star-delta starter.

Qstart Circuit diagram with Main and Delta contactors closed

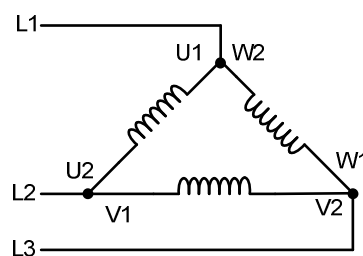
This is equivalent to connecting the motor in the delta 400V configuration. The delta connection is the running connection for the motor. Please connect to the motor as per this top diagram.



Equivalent to -



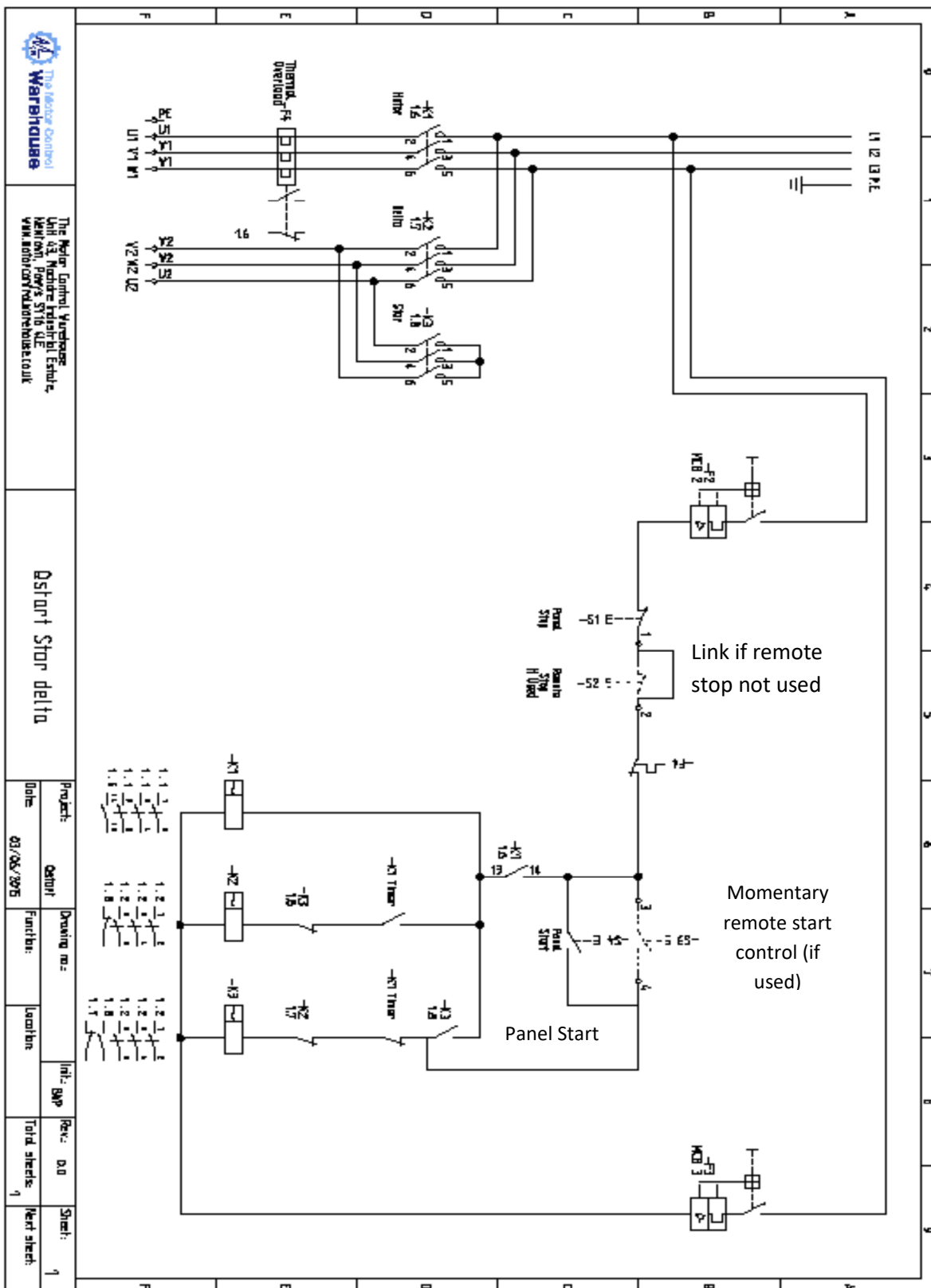
Delta winding connection



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.

Qstart Circuit diagram (400VAC Control)



Operation

The Qstart range of enclosed star-delta starters is designed to be as close to a plug and play product as possible. They require a suitable 3 phase and earth power supply and a 6-wire and earth motor cable.

The SDS is equipped with:

- Green start button
- Red stop button
- Motor thermal overload (**Located inside the unit, power must be removed prior to opening the lid of the Qstart**).

Start Button - When pressed the star-delta contactors will initiate starting the motor.

Stop Button - When pressed, the star-delta contactors will open and the motor will 'coast to a stop'.

Motor Overload – When the motor overload trips the star-delta contactors will open and the motor will 'coast to a stop'. The motor overload will require a reset and a start command for the motor to restart.



WARNING

The Qstart may be fitted with an optional Emergency Stop button. This may be a requirement of the system that the Qstart is used within.

The Key Release Emergency Stop Button on this equipment (if fitted) gives a 'category zero stop' (coast to stop). It is a low integrity level, PLa system. Therefore a single fault can lead to a loss of the safety function. Please check this is adequate for your machine/equipment.

There is no mains isolator and no power MCB, these must be provided externally to the Qstart.

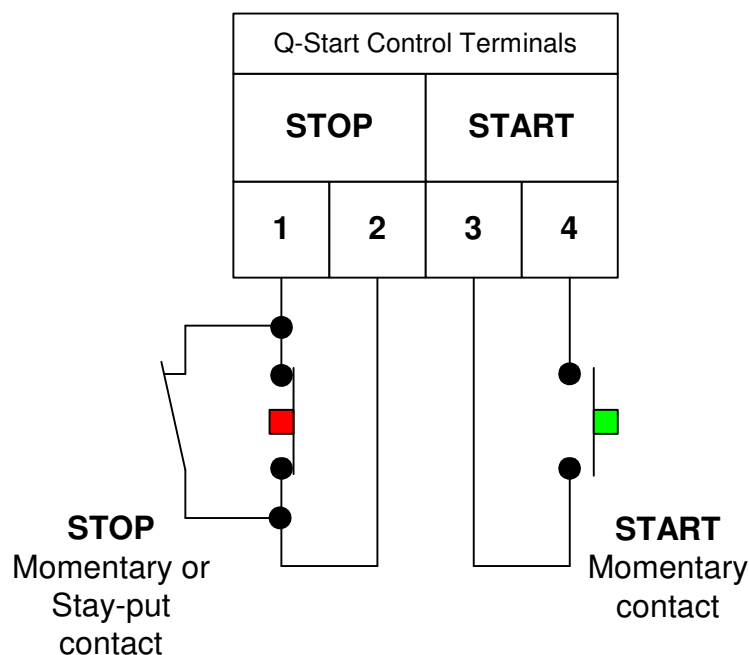
External Start & Stop Connections

If the SDS is to be controlled from the external start connections, the external start must be from a momentary contact and NOT from a latching / stay-put contact. See diagram on page 8.

The external start must be a momentary contact to prevent the SDS automatically starting after the STOP button has been pressed and released or after the optional E-STOP button has been released.

The external stop contact can be either a momentary or stay-put contact.

External Start/Stop connections diagram



Timer Setting

The timer setting is dependent on the driven load and inertia and can be determined as follows:

There are two basic ways of determining the correct point at which the timer should change the winding configuration from 'star' (starting mode) to 'delta' (running mode). Both methods determine the point at which the rotor has achieved its maximum speed in star, and therefore the point at which the starter should change to delta.

Current measurement method

Set the delta timer to its maximum setting. Put a clip-on ammeter on one of the lines FEEDING the starter. Set a stopwatch going when you press the start button. Watch the ammeter - it will peak immediately on start up, then the current will drop off as the load accelerates. As soon as the current steadies off, stop the watch. At this point (approximately 85% full load speed) the motor can achieve nothing more by remaining in star, and this is the latest point in time that delta changeover should be made.

Speed measurement method

Use a tachometer on the motor shaft (mechanical or optical) to measure motor speed. Set the delta timer to its maximum setting. Again, use a stop watch. Observe the Tacho. Acceleration characteristics will vary dependent on the driven load, but the speed will settle out at approx. 85% full load speed (this can usually be heard by the tone in the motor being constant). Stop the watch at this point. Set the timer to the time recorded on the stop watch.

NOTES

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

Other Enclosed Products from Motor Control Warehouse

- **Enclosed Inverter Drives**, single phase input from 0.75kW to 4kW. Three phase input from 0.75kW to 45kW.



Features

IP54 robust enclosure
Interlocked isolator
10kA MCBs
Tri rated cable
Keyed Inverter Disable button
IP rated speed pot
Motor connections to terminals
Fwd/Rev switch
Stop/Start buttons
Indication lamps
Thermostat controlled cooling
ID/HD700 industrial inverter

- **Enclosed Soft Starters**, from 7.5kW to 55kW, three phase input. All these products are rated at trip class 10 (medium industrial loads).



Features

3 phase MCB
Control MCBs
Interlocked mains isolator
Motor thermal overload
Bypass contactor
Stop/start pushbuttons
Keyed soft stop button
Running and healthy lamps
Customer terminals
IP65 Steel enclosure
24Vdc power supply
Tri rated cable
Fairford Electronics DFE Soft