**International Journal of Research Publication and Reviews**

Journal homepage: www.ijrpr.com ISSN 2582-7421

# MANUAL STAR DELTA STARTER

***Mr. A.A.Patil[1], P.P.Karande[2], N.A.Jagtap[2], A.R.Jamadar[2], A.S.Patil[2].***

*[1]Lecturer / Department of electrical engineering, Sanjay Ghodawat Polytechnic Atigre / India.*
*[2]Student / Department of electrical engineering, Sanjay Ghodawat Polytechnic Atigre / India, Parth.Karande4059@gmail.com*

**ABSTRACT**

This equipnmentr/apparatus diminishes beginning current and beginning force. Manual Star Delta Starter configuration ordinarily comprises of three contactors, an over-burden transfer or electrical switch. For the Star Delta Starter, an engine should be in delta associated position during a typical run and the primary intention is to have the option to utilize the starter. Whenever the engine is out of gear, it simply resembles the shortcircuited transformer at optional side since all the rotor bars are associated together to shape a shut way. This will draw an enormous current course through the rotor bars. In this way, when the engine is turned over, stator draws high current which is 8-10 times that of the evaluated current. Accordingly, prior to turning over the engine, it is important to decrease the voltage applied to the engine. In Star association current is in various stages yet line voltage is root multiple times that of the stage voltage. Thus, the voltage is decreased which brings about decrease of current assuming engine is turned over in star association. In Delta association the voltage is same as that of stage voltage so full voltage is applied assuming we run the engine in delta association. The Star/Delta Starter is for the most part gotten from three contactors, pneumatic clock, and a warm over-burden transfer or electrical switch, for 3 stage engine at 440 volt AC principle supply 50 Hz.

## 1. INTRODUCTION

**Function of Starters: -** The gadget which is utilized to restrict the beginning current and diminish the beginning force is called Starter. It decreases the beginning current to a protected worth.

**Need of Starters: -** Rotor current at stop, I = E/Z = E/√ ($r2 + x2$) The size of E relies upon the transition connecting with the rotor guides and its relative speed. The strength of the rotor transition relies on the applied voltage. At the moment of applying appraised voltage to the stator winding, rotor is fixed and as such the slip is solidarity. Along these lines, on the off chance that full evaluated voltage is given to stator twisting, extent of the emf actuated in rotor guides will be high, in light of the fact that the general speed between the rotor guides and stator spinning transition is extremely high for example equivalent to the simultaneous speed of the stator motion. Further the rotor guides are short-circuited and subsequently have low impedance. Subsequently the ongoing drawn by the stator winding or engine is exceptionally enormous, roughly 5 to multiple times the full burden current.

**The ill effects of high starting current are as follows: -** The copper losses happening in the stator and rotor windings due high beginning current are very huge, which would create a ton of hotness inside the machine and may harm the protection of the windings. Additionally, there will be a plunge in supply voltage.

**The starting current drawn by the motor can be reduced to a permissible value by:**

1. Applying reduced voltage to the stator winding
2. Inserting resistance in the stator circuit
3. Inserting resistance in the rotor circuit

In case of slip ring induction motors, it is feasible to add outside opposition in rotor stages as wound rotor has 3 stage star associated twisting to restrict the beginning high current. Notwithstanding, in the event of squirrel confine enlistment engines it is absurd to expect to add any caring outside opposition as it comprises of copper bars, which is short-circuited by end rings on the two sides. In this way, if there should be an occurrence of squirrel confine acceptance engines, introductory high current is constrained by applying decreased voltage to stator twisting during beginning period and the full ordinary voltage is applied when rotor has gotten a move on to around 70 to 80% of its not unexpected speed.

**Different types of starting methods: -**

**AC Starters:-**

1. D.O.L Starter (Direct Online)
2. Automatic/Manual Primary Resistance Starter
3. Automatic/Manual Autotransformer Starter
4. Automatic/Manual Star Delta Starter

**Direct Online Starter (D.O.L):-** It comprises of contactors which a charged when supply is given to them and permits streaming same voltage to stator windings. This starter is exceptionally straightforward modest and simple to introduce and keep up with. Under defective circumstances over-burden transfers are available which deenergize contactor and stops the progression of current. Yet, in this beginning the pace of temperature climb is exceptionally high and engine might get harmed in the event that the beginning period is huge, which might be because of unnecessary voltage drop in supply lines. Consequently, this sort of starter is for the most part utilized for engine appraisals up to 5KW.

**Automatic/Manual Primary Resistance Starter: -** In this sort of starting of 3 stage induction motor essential opposition are associated in every one of the three periods of the stator twisting because of which the applied voltage across stator twisting at the moment of beginning is decreased to a negligible part of appraised voltage of engine. In manual starter obstruction is expanded or diminished physically while in programmed specific fixed worth of opposition is there for fixed time with the assistance of pneumatic clock associated across contactors. This beginning technique warms up beginning resistors and a lot of force misfortune results. In this way, they are utilized for little engines or less appraised esteem engines.

**Automatic/Manual Autotransformer Starter: -** In this technique 3 stage auto transformer with fixed tappings is utilized to get decreased voltage for beginning of 3 stage enlistment engines. Typically 50 to 60% tappings can used to acquire a protected benefit of beginning flows. Crashes 50 to 60% of the appraised voltage is applied at beginning and the autotransformer is removed of the engine circuit, when engine has gotten a move on around 70 to 80% of the typical speed by changeover switch. Same thing is accomplished in programmed starter by interlocking component of contactor with pneumatic clock. This starter can be effectively utilized all things being equal or essential obstruction starter where warming of resistors was a significant issue. This starter gives same measure of voltage decrease and doesn't prompt warming impact.

**Automatic/Manual Star Delta Starter: -** This is the most ordinarily utilized starter, contrasted with various sorts of starters. Star Delta starter deals with the standard of voltage decrease during beginning period. In star association current is same as that of to line and stages yet line voltage is times progressively work voltage which prompts decrease in voltages in beginning period. At the point when the engine has gotten a move on we can express up to 70 to 80% of its evaluated speed the stages changeover to delta association position. In delta association voltage across lines is same as that of stage voltage. A star delta starter is less expensive contrasted with auto transformer starter. In this way, it is regularly utilized for both medium and little size engines. Since force is relative to square of applied voltage, star delta beginning diminishes beginning force to 1/3 of that got from Direct on the web. The programmed star to delta changeover is gotten by involving interlocking association in contactors with that of pneumatic clock which changes over to delta after a decent timeframe.

**What is Star Delta Starter: -** This is a starting method that lessens the beginning current and beginning force. Star delta starter configuration ordinarily comprises of three contactors, an over-burden transfer or electrical switch and a clock for establishing the point in time in the star-position (beginning position). For the star delta starter, an engine should be in delta associated during a typical run and the fundamental design is to have the option to utilize star delta starter. In Star delta starter the got beginning current is around 30% of the beginning current during direct on line start and the beginning force is diminished to around 25% of the force accessible at a D.O.L starter. Star delta starter possibly works when the application is light stacked during the beginning. Assuming that the engine is excessively intensely stacked, there won't be sufficient force to speed up the engine up to speed prior to exchanging over to the delta position. Figure 2.1 shows manual star delta starter where star to delta changeover of done by changeover switch system. As the engine gets a move on and comes to up to beneficial speed, switch is changeover of delta for running condition prompting full voltage supply. Not at all like manual star delta starter in programmed star delta starter as displayed in figure 2.2 an outside circuit in particular control circuit is available which comprises of clock contacts. With these clock contacts we can change star association with delta association naturally inside season of 0-30 seconds as wanted. This time term can be fluctuated according to beginning and running qualities according to our necessity. Contactors are utilized for changeover instrument. These contactors are associated by controlling circuit with clock box to in like manner work.

**Star-delta Starter Consists following units:**

1) Contactors (Main, star and delta contactors) 3 No’s (For Open State Starter) or 4 No’s (Close Transient Starter).
2) Time relay (pull-in delayed) 1 No.
3) Three-pole thermal over current release 1No.
4) Fuse elements or automatic cut-outs for the main circuit 3 Nos.
5) Fuse element or automatic cut-out for the control circuit 1No.

**Power Circuit of Star Delta Starter:**

**In effect, there are four states:**

- The principle electrical switch fills in as the primary power supply change that provisions power to the power circuit.
- The fundamental contactor interfaces the reference source voltage R, Y, B to the essential terminal of the engine U1, V1, W1.
- In activity, the Main Contactor (KM3) and the Star Contactor (KM1) are shut at first, and afterward after a timeframe, the star contactor is opened, and afterward the delta contactor (KM2) is shut. The control of the contactors is by the clock (K1T) incorporated into the starter. The Star and Delta are electrically interlocked and ideally precisely interlocked also.

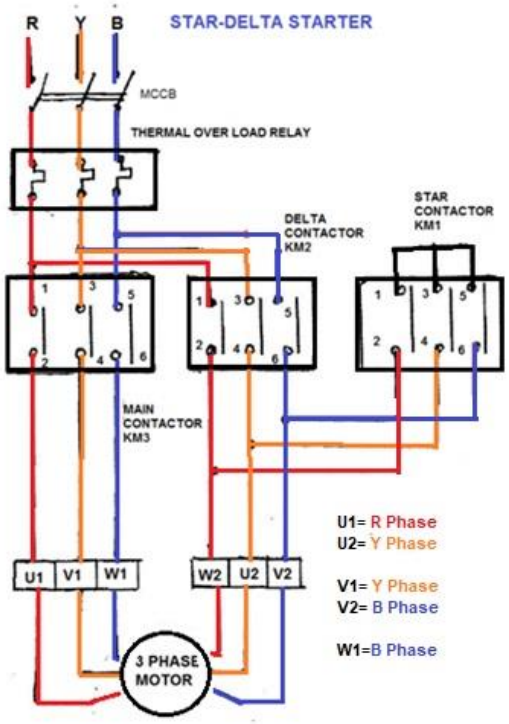
**Working of Manual Star Delta Starter:**

This sort of starter requires no abilities to turn it on. Anybody can turn it on typically. A press button is utilized to turn it on and off. There is a mechanical switch on the rear of the press button. Finishes the circuit when turned on and breaks or opens the circuit when shut.

The manual starter gives security against over-burden however doesn't safeguard against low voltages. That is, in the event of force disappointment it can't break the circuit which can be a fiasco for certain applications.

The engine must be restarted when the power is reestablished. This is utilized for low-power engines. Direct on the web (DOL) starter is a sort of manual starter that gives over-burden insurance however not against low voltage.

**Circuit diagram of star delta starter: -**




## 2. CONCLUSION

This sort of beginning is utilized for low to medium voltage and light turning over force engines. It is the least expensive method for lessening the beginning current and it is in the request for 3-4 times that if there should be an occurrence of direct web based turning over of enlistment engine. It very well may be effortlessly carried out by the transfers and the clock circuit.

The approach to associating the transfers additionally keeps the engine from the single staging. The venture is intended to give low voltage turn over to enlistment engines. This is accomplished by utilizing star to delta change. Star/Delta starters are likely the most widely recognized diminished voltage starters in the 50Hz modern engine world.

Star delta is utilized trying to decrease the beginning current applied to the engine then, at that point, after at some point full burden current is applied to the engine. Since in star association current is same in various stages while line voltage is the root multiple times the stage voltage. Thus, the voltage is decreased (results to lessen current) on the off chance that engine is turned over as star. The interlocking course of action of all the contactor curls is

generally wired in 440-volt AC. The undertaking is intended to give low voltage turn over to acceptance engines. The Star/Delta starter is by and large produced from three contactors; and pneumatic clock for working a 3-stage engine at 440 volts at ac mains supply 50 Hz.

## REFERENCE


[1] Jamnani J.G, "Elements of Electrical Design", Mahajan Publications, 2015, chap-3, pp. 3.1-3.20.

[2] Gupta J.B, Theory and performance of Electrical machines, Katson books publications, 15 edition: 2015 Section V, pp. - 5.1 – 5.30.

[3] Jignesh Parmar, wordpress.com Star delta Starter.https://electricalnotes.wordpress.com/2012/03/16/star-delta-starter/

[4] PLC training - Star Delta Starter, wiring animated video, Real Pars https://youtu.be./qA3Yg5CS-F8/

[5] Star Delta 3-phase Motor automatic starter with timer, http://www.electricaltechnology.org/2012/02/star-delta-3-phase-motor-starting.html

[6] Star delta starter motor control with circuit diagram – practical video, Motor circuits, https://www.youtube.com/watch?v=doBPliY-cik

[7] Semi-automatic star delta starter, RJ electrical, https://www.youtube.com/watch?v=7pY7Koh-Gi8

[8] 3 phase induction motor starting with industrial star delta starter, EL-PRO-CUS, https://www.elprocus.com/industrial-star-delta-starter-3-phase-induction-motor/

[9] Circuit globe, Star delta starter, http://circuitglobe.com/star-delta-starter.html 10. Academia education, automatic star delta starter with adjustable timer,,http://www.academia.edu/23086369/AUTOMATIC_STAR_DELTA_STARTER_USIN G_RELAYS_AND_ADJUSTABLE_ELECTRONIC_TIMER_FOR_INDUCTION_MO TOR_Project_Synopsis.