

A smiling couple, a man and a woman, are standing in a lush green field. The man is wearing a striped kurta and an orange turban, holding a wooden handle. The woman is wearing a red sari. A large black pipe is visible on the left, with water spraying out from it. The background is a clear blue sky.

**SIEMENS**

*Ingenuity for life*

## Agriculture Starter complying to latest standards

Automatic Star Delta Starters IEC 60947-4-1:  
2012 Compliant

Direct-on-Line Starters ISI Marked-BIS Approved

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## Tried, Tested and Trusted Start with Siemens Agriculture Starters

For more than 125 years, Siemens has been developing and manufacturing world-class, control products. Siemens offers a wide range of starters to cater to diversified demands from Agriculture Sector. These products are specially designed to provide smart, easy and reliable motor starting solution.

They employ tried and tested Siemens contactors and relay and this ensures the right start for motors requiring direct online starting or star delta starting.



## Direct on Line Starter (DOL) RAJA<sup>+</sup>

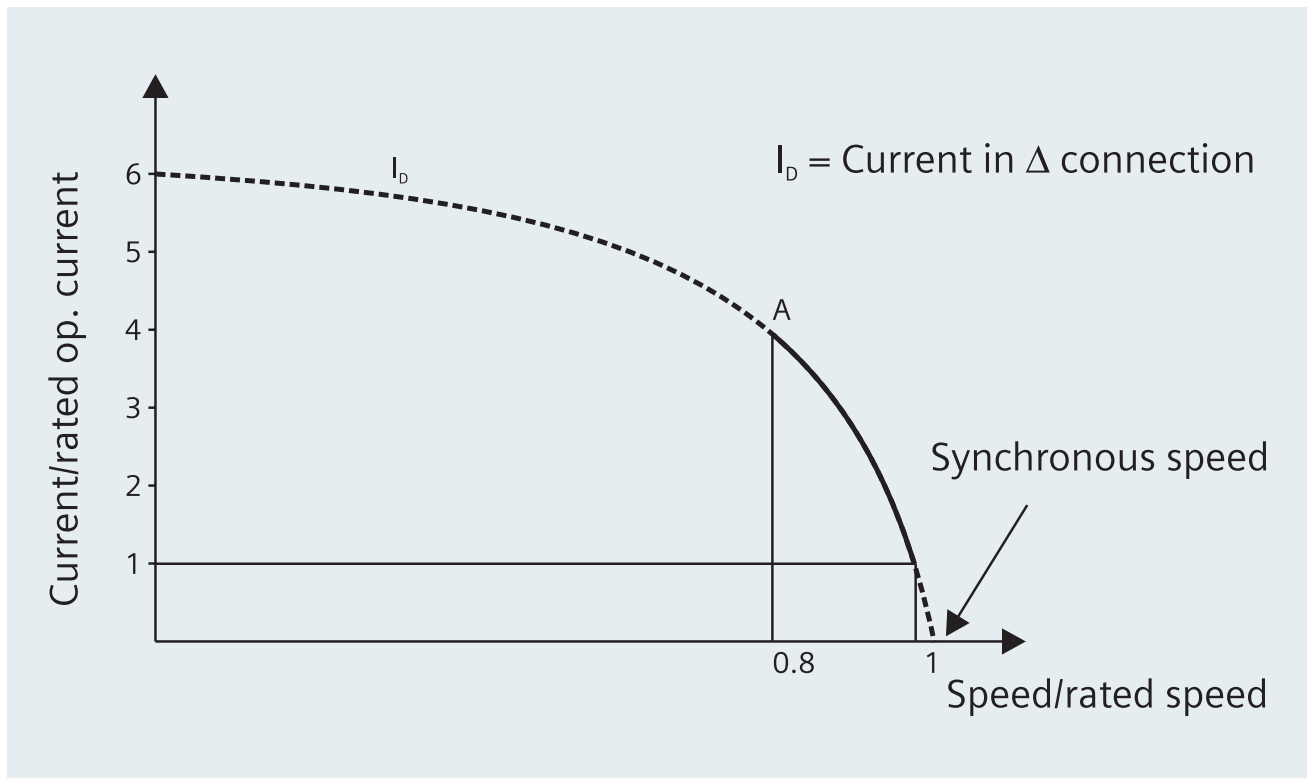
3TW7291-1A...

Range: 0.25kW to 7.5kW

0.33HP to 10HP

### Method of starting

A. DOL starting method:



The most economical and popular method of starting squirrel cage induction motors, is direct-on-line, where the starter is connected directly across the supply. However, the starting current at the moment of switching Direct-on-line can be as high as 6-8 times the rated current.

#### Advantages:

High starting torque, shorter starting time, simple construction and wiring, space saving etc.

#### Disadvantages:

High starting current

#### Applications:

DOL: As we know, A direct on line starter can be used if the high inrush current of the motor does not cause excessive voltage drop in the supply circuit. It can be used to start small agriculture water pumps, compressors, fans and conveyor belts etc.

## Construction



*Availability of Agriculture starters in new design: DOL - 15th Dec. 2020 | ASD - 15th Feb. 2021*

### **Contactor:**

The DOL starter up to 10 HP is fitted with 3TS3 Contactor. This contactor is specially designed by Siemens considering the requirements of industry as well as agriculture. Considering the specific need of the agricultural pump set applications, Siemens has designed a special wide band coil (200- 400V). This coil operates reliably even when there is wide voltage fluctuation.

The Starters will now come with 3TS Contactors which will in turn make the starter more reliable with enhanced electrical and mechanical life.

## Bimetal Overload Relay:

The RAJA direct-on-line starter is fitted with 3UW5 relay. These relays are computer calibrated and therefore, offer accurate protection. The main benefit of this bimetal relay is the built-in single phasing protection in addition to the overload protection. Relay has Automatic reset function after cooling time of 4 sec approx, completely reduce Manual dependency.

### **Push buttons**

Push buttons are used for switching 'ON' and 'OFF' the starter. Twin push button comes with 'Locked Off' feature which helps in avoiding nuisance switching ON of pump.

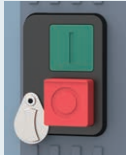
### **Operation:**

In DOL starting, the 'ON' push button is pressed, which energizes the contactor coil, thus switching on the circuit. When the OFF' push button is pressed, the contactor is de-energized, switching off the circuit. The bimetal relay under normal functioning of motor plays no active part in the starter. But under overload, single phasing or locked rotor conditions of Motor, the bimetal relay cuts-off the supply to the contactor coil, tripping the circuit. The contactor itself provides the necessary 'no-voltage' protection in so far as it will drop out in the case of a supply failure, and for restarting on resumption of supply, the 'ON' push button will have to be pressed again.

### **Reliability:**

- 3TW72 range of DOL starters are having option of 200-400 V Coil voltage which takes care of wide fluctuations in supply.
- Accurate protection under single phasing & overload.
- With ISI marking, it ensures more safety for the end user.
- With 3TS contactors fitted into it, ensures more electrical and mechanical life of the Starter.
- With Locked off feature, ensures that undesirable switching on of the Starter is prohibited.
- No Auto start only Auto reset of Bimetal relay and it needs Manual Acknowledgement to again ON the Starter.

## Key Highlights



Latched OFF feature  
available



RAJA Starter with  
ISI mark



Fitted with 3TS  
Contactors and 3US  
over load relays

# Technical Details of the Starter

Table A:

Motor Rating At 415V 3ph 50Hz		Starter Type	Contactor	Relay 3UW51		Back-up Fuse Rating		Cu Cable (mm <sup>2</sup> ) size	Max. Full Load Current (Amp)		
HP	kW			Range	Code ##	HRC type 3NA 7	Rewirable		3Ph, 415V, 4P Squirrel Cage IS 8789:1996 Table 4	3Ph, 415V, 2P Submersible motor IS 9283:1995 Table 2	1Ph, 240V, CSIR or Split-Phase IS 996-1979 Table 9
0.33	0.25	3TW72 91-1A* 64	3TS3010-0A##08KA0	0.63-1	0J	2A	36 SWG	1	-	-	3.8
0.75	0.55	3TW72 91-1A* 66	3TS3010-0A##08KA0	1-1.6	1A	6A	34 SWG	1	1.7	-	7
1	0.75	3TW72 91-1A* 68	3TS3010-0A##08KA0	1.6-2.5	1C	6A	27 SWG	1	2.2	-	7
1.5	1.1	3TW72 91-1A* 69	3TS3010-0A##08KA0	2-3.2	1D	10A	26 SWG	1	2.9	3.25	13
2	1.5	3TW72 91-1A* 71	3TS3010-0A##08KA0	3.2-5	1F	16A	25 SWG	1	3.8	4.5	18
3	2.2	3TW72 91-1A* 72	3TS3010-0A##08KA0	4-6.3	1G	16A	24 SWG	1.5	5.1	6.5	-
5	3.7	3TW72 91-1A* 74	3TS3010-0A##08KA0	6.3-10	1J	16A	21 SWG	1.5	8.1	10	-
7.5	5.5	3TW72 91-1A* 75	3TS3210-0A##08KA0	8-12.5	1K	25A	19 SWG	1.5	11.4	14.5	-
7.5	5.5	3TW72 91-1A* 77	3TS3210-0A##08KA0	10-16	2A	25A	18 SWG	2.5	-	-	-
10	7.5	3TW72 91-1A* 78	3TS3210-0A##08KA0	12.5-20	2B	32A	18 SWG	4	15.4	19.5	-

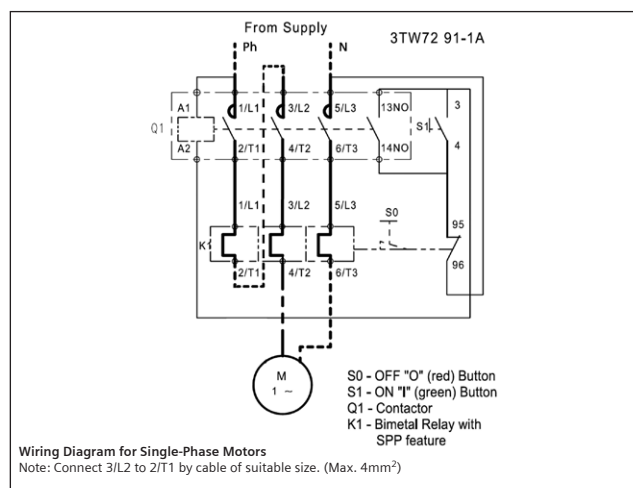
\* Code for operating coil voltage, 50 Hz (B for 200-400V, W for 415V)

## Code for operating coil voltage, 50 Hz (Z6 for 200-400V, R0 for 415V)

## Spare list

Sr. No.	Description	Order No.
1	Contactor for 200-400V	3TS30-10-0AZ608K
2	Contactor for 200-400V	3TS32-10-0AZ608K
3	Contactor for 415V	3TS30-10-0AR008K
4	Contactor for 415V	3TS32-10-0AR008K
5	Relay	3UW51 02-##
6	Coil for 200-400V	3TY7 403-0AZ6
7	Coil for 415V	3TY7 403-0AR0
8	1NO Contact Block	3SB54200B
9	'ON' & 'OFF' Push Button	#
# – contact sales		

## Raja+ Direct-on-line Starter (For Single Phase connection)

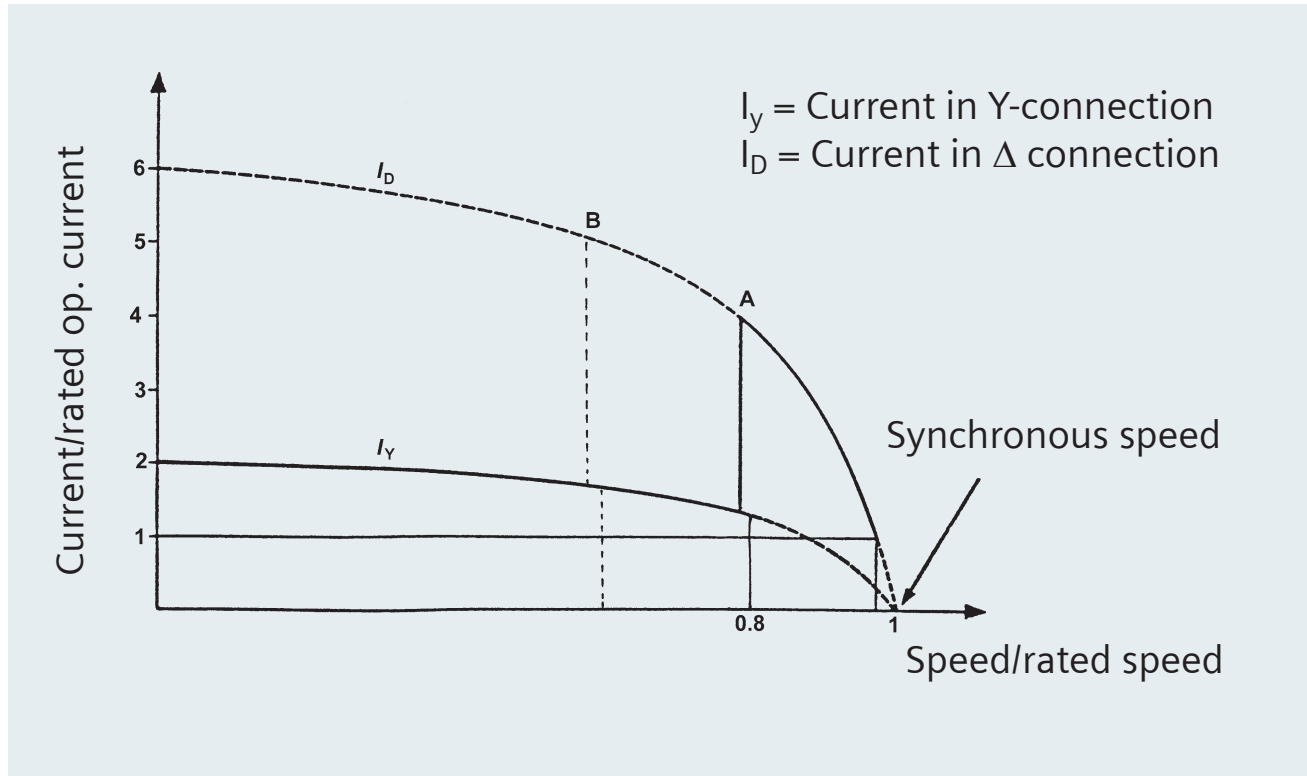


# Automatic Star Delta Starter 3TE7291-0A

## ASD-11 Starter (Self reset)

Range: 7.5kW to 18.5kW

10HP to 25HP



In star delta starting, initially the motor windings are connected in star. This reduces the starting current by 1/3rd of the full load current also the voltage by  $(1/\sqrt{3})$  of the rated value. As the torque is proportional to the square of the voltage, the starting torque also gets reduced to 1/3rd of its full load value. Once the motor attains approximately 80% of the rated speed, the windings get connected in the delta formation.

Thus by star delta starting, the starting current is reduced to 2 to 2.5 times the rated current unlike DOL starting, where it is 7 to 8.

### Advantages:

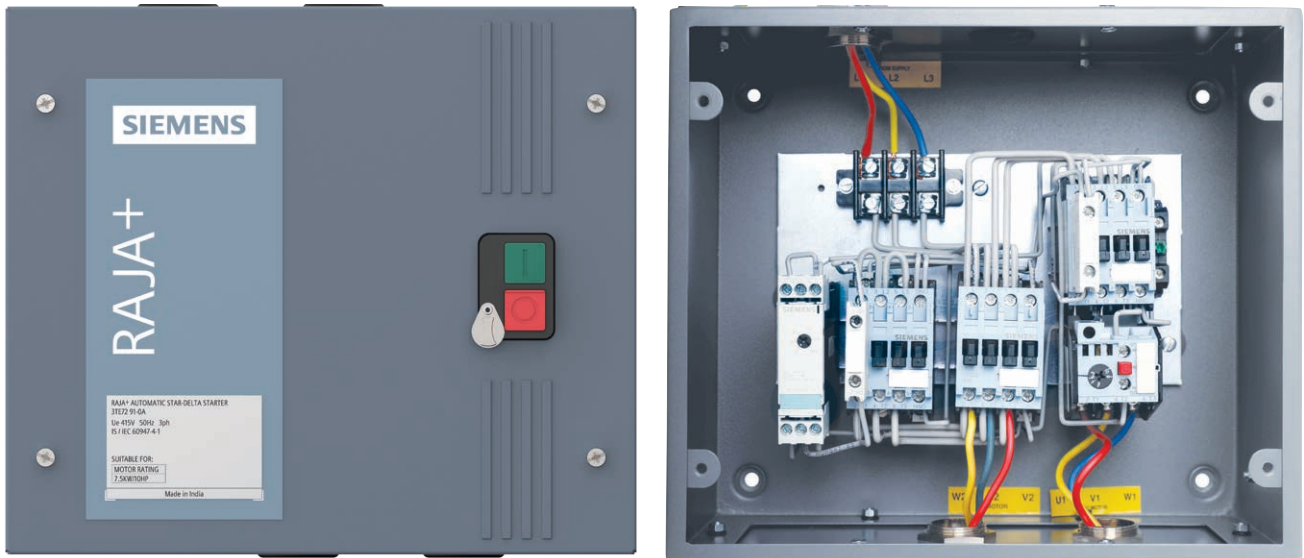
low starting current

### Disadvantages:

Low / medium starting torque, longer starting time, less simpler construction and wiring, requires more space etc.



# Construction



**Automatic Star Delta Starters fitted with 3TS contactors**

*Availability of Agriculture starters in new design: DOL - 15th Dec. 2020 | ASD - 15th Feb. 2021*

## **Construction:**

It consists of a star-delta timer (3RP), contactor (3TS3), and overload relay (3UW51).

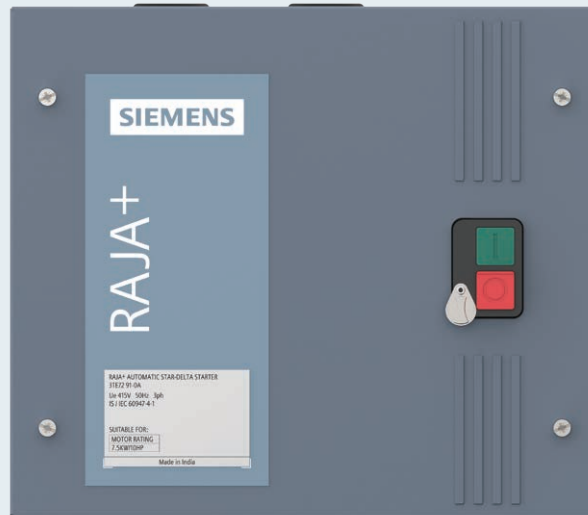
## **Operation:**

In this starter, the changeover from 'star' to 'delta' is done automatically after a preset time by using a timer.

## Key Highlights of Star Delta Starter



Latched OFF feature  
available



Compact Size



Fitted with 3TS  
Contactors

# Technical Details of Automatic Star Delta Starter

**Table A: Automatic Star - Delta Starter Type Ref: 3TE7291-0A**

Motor Output at 415V (kW/HP)	I(fl) 4 Pole Squirrel cage motor		Contactor Line	Contactor Delta	Contactor Star	Recommended Overload relay at 50°C		Recommended Fuse Switch		Recommended Cu Cable size (mm <sup>2</sup> )	
	Line current (A)	Phase current (A)	Type Reference			Type - Code	Relay Range (A)	Type	Back up HRC fuse rating(A)	Incoming (from supply)	Outgoing (tomotor)
7.5/10	16	9.2	3TS32 10-0A*08K	3TS32 01-0A*08K	3TS32 10-0A*08K	3UW51 02-1J	6.3-10	3KL812	20	2.5	1.5
9.3/12.5	19.5	11.2	3TS32 10-0A*08K	3TS32 01-0A*08K	3TS32 10-0A*08K	3UW51 02-1K	8-12.5	3KL812	25	4	2.5
11/15	23	13.2	3TS32 10-0A*08K	3TS32 01-0A*08K	3TS32 10-0A*08K	3UW51 02-2A	10-16	3KL812	25	4	2.5
15/20	32	18.4	3TS33 00-0A*08K	3TS33 00-0A*08K	3TS32 10-0A*08K	3UW52 02-2B	12.5-20	3KL812	50	10	4
18.5/25	38.5	22.2	3TS33 00-0A*08K	3TS33 00-0A*08K	3TS32 10-0A*08K	3UW52 02-2C	16-25	3KL812	50	10	4

\* Code for operating coil voltage 50 Hz (Z6 for 200-400V, R0 for 415V)

## Other Tables:

Star-Delta Timer:	
AC Input Voltage	MLFB
230V-400V	3RP15 76-1NP20 8K
380V-440V	3RP15 76-1NM20 8K

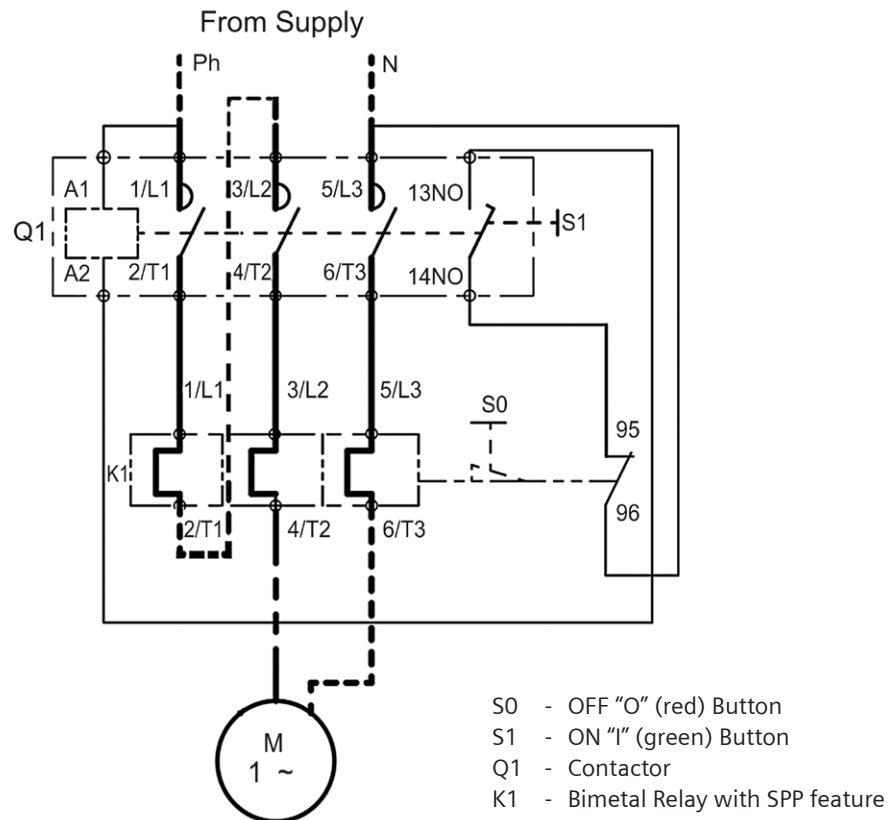
Spares:		
Sr. No.	Description	Order No.
1	Contactor for 200-400V	3TS30-10-0AZ608K
2	Contactor for 200-400V	3TS32-10-0AZ608K
3	Contactor for 415V	3TS30-10-0AR008K
4	Contactor for 415V	3TS32-10-0AR008K
5	Relay	3UW51 02 Refer Table A
6	Relay	3UW52 02 Refer Table A
7	Coil for 200-400V	3TY7 403-0AZ6
8	Coil for 415V	3TY7 403-0AR0
9	1NO Contact Block	3SB54200B
10	'ON' & 'OFF' Push Button	#
# – contact sales		

## Single Line Diagrams:

DOL (Direct online starters)

### Raja<sup>+</sup> Direct-on-line Starter (For Single Phase connection)

3TW72 91-1A



#### Wiring Diagram for Single-Phase Motors

Note: Connect 3/L2 to 2/T1 by cable of suitable size. (Max. 4mm<sup>2</sup>)

## ASD (Fully Automatic Start Delta Starters)

- Q1 - Line Contactor (+2NO)
- Q2 - Star Contactor (+1NO+1NC)
- Q3 - Delta Contactor (+1NC)
- S1 - ON Push Button
- S4 - OFF Push Button
- Q4 - Star Delta Timer with 1NO  
Instantaneous and 1NO  
Delayed Aux. Contact
- K1 - Bimetal Relay

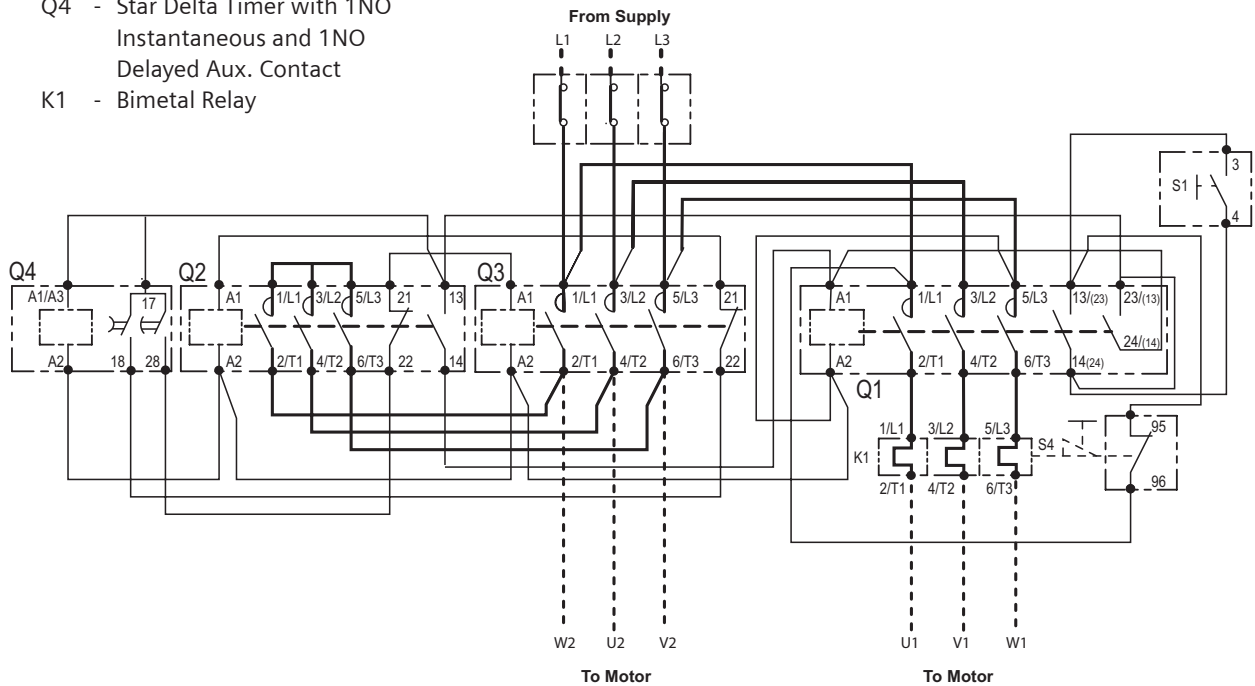


Diagram shows connections made for contactor coils operating range 200-400V 50Hz (wide band) & coil rated 415V 50Hz.  
(13), (14), (23), (24) applicable incase of 20 HP & 25 HP.

### 3TE72 91-0A / Automatic Star-Delta Starter

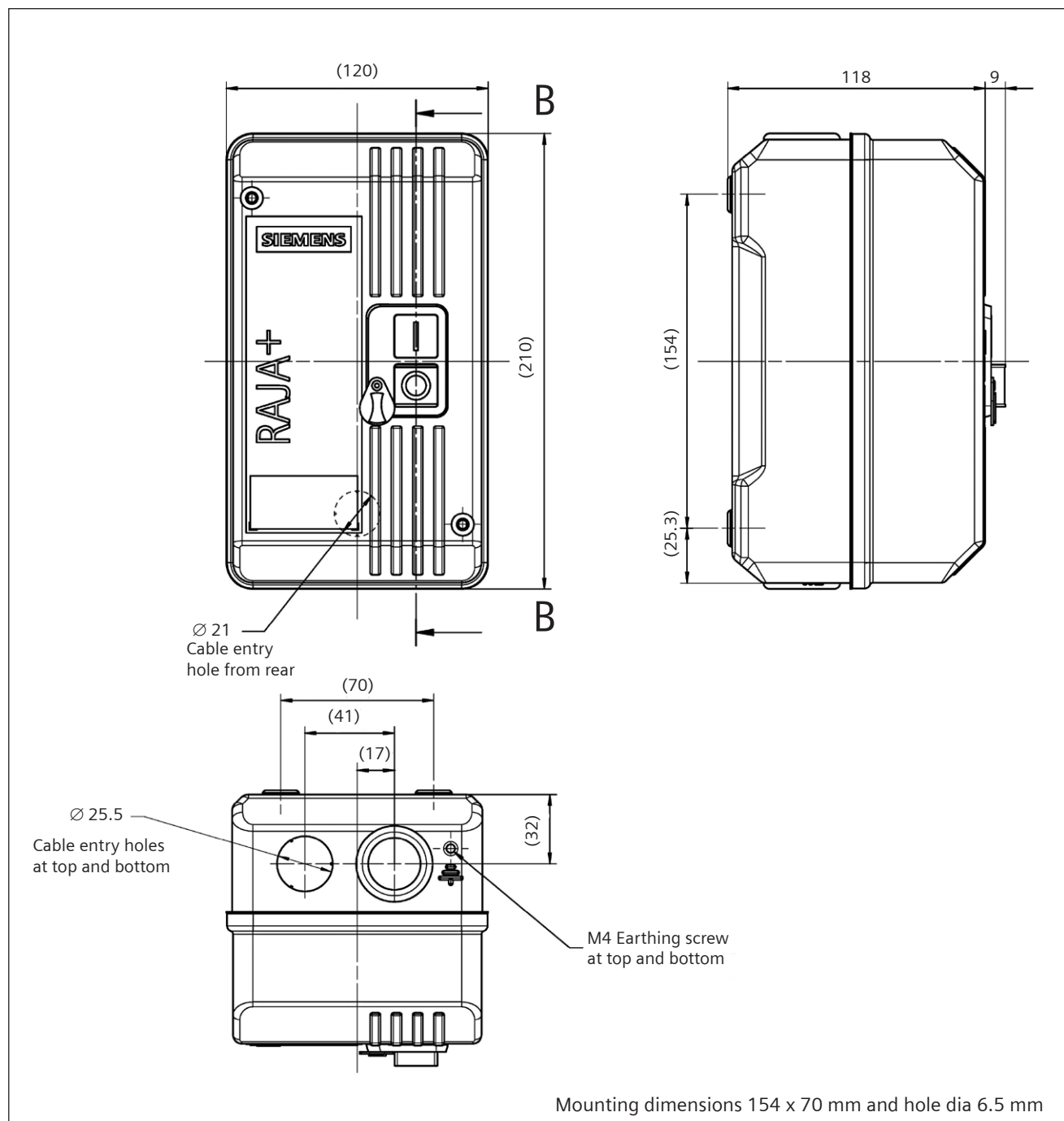
Coil Voltage / Coil Operating Range = V 50Hz

Motor Output at 415V (kW/HP)	Relay Range 3UW51/52 (A)	Recommended Backup Fuse type 3NA3(A)	Recommended Cu Cable (mm sq.)	
			Incoming	Outgoing
7.5 / 10	6.3 - 10	20	2.5	1.5
9.3 / 12.5	8 - 12.5	25	4	2.5
11 / 15	10 - 16	25	4	2.5
15 / 20	12.5 - 20	50	10	4
18.5 / 25	16 - 25	50	10	4



# DOL Dimensional Drawing

Raja Direct On-Line Starter



# ASD Dimensional Drawing

Automatic Star Delta Starter

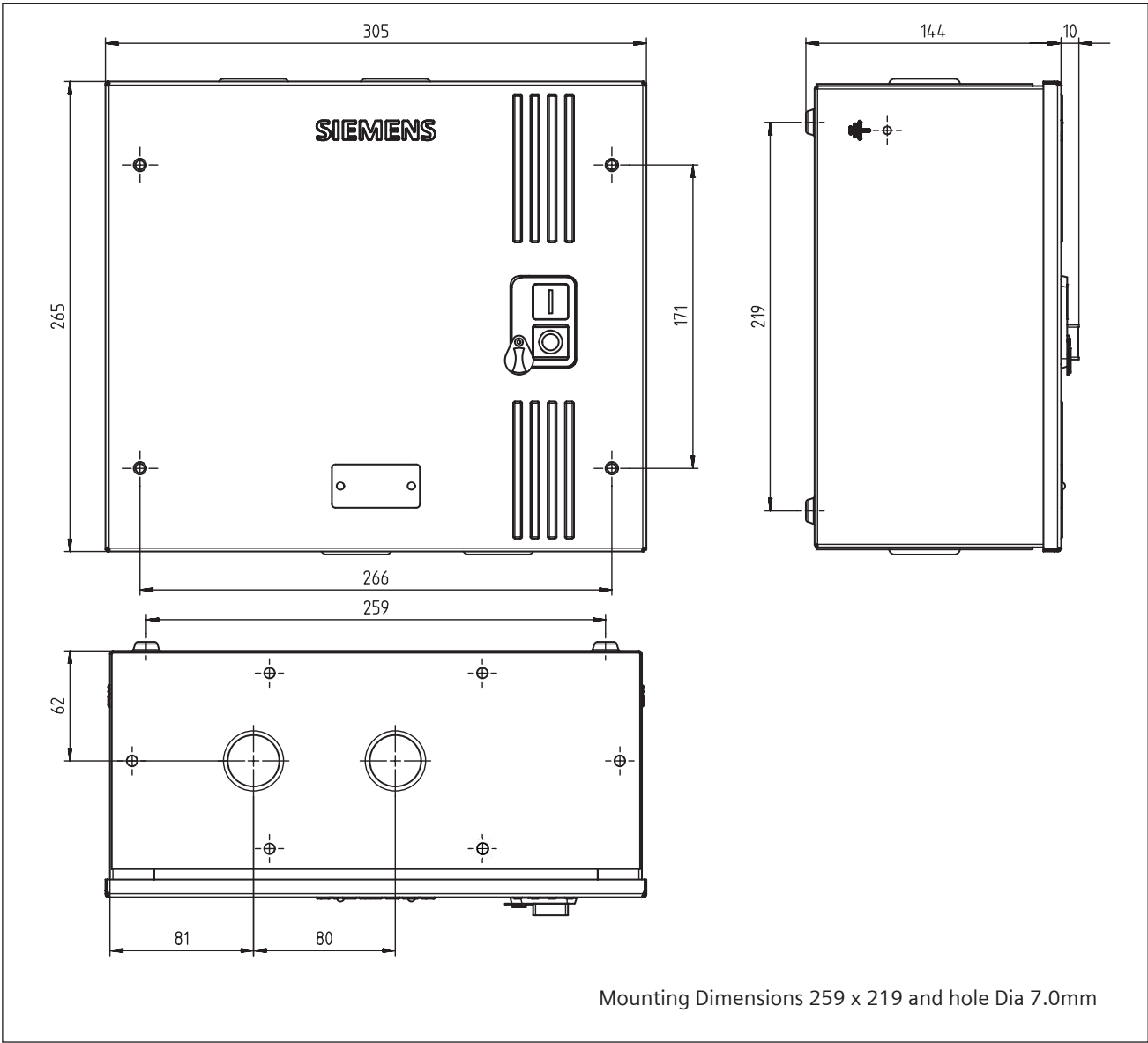


Fig. 8: Dimensional Details for 3TE72 91-0A\*\*

Siemens Limited  
Smart Infrastructure  
Electrical Products  
R&D Technology Centre  
Thane Belapur Road, Airoli Node  
Navi Mumbai - 400708

[www.siemens.co.in](http://www.siemens.co.in)

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