SIEMENS

Installation, Operation & Maintenance Instructions

DOL Starter Type 3TW42 00

(open execution)

Siemens Ltd.
SGR-01-103-035

41-0089-0115980 001

For dependable service, it is of utmost importance that instructions given below are followed for selection, inspection, installation, commissioning, operation and maintenance.

Selection:

- Refer Table A,B,C and D for recommended selection of starters.
- Table A: kW/HP rating,thermal overload relay range & fuse rating.
- Table B: Coil voltage
- Table C: Relay range codes.
- Table D: Max full load currents for different types of motors.

Inspection:

- Ensure that the relay range and coil voltage are as per your requirement.
- Inspect interior for breakage.
- If you find a serious defect, do not use the product but have it checked by an authorized Siemens dealer or an electrician.

Installation:

- Mount the starter in an enclosure and the enclosure on a vertical rigid surface free from vibration. The drilling template is enclosed for convenience. Refer Fig.1 for mounting dimensions and Fig.2 for permissible displacement from vertical plane.
- The enclosure should not allow ingress of dust,dirt or contamination.
- Connect the incoming and outgoing cables as follows :
  - Select the correct size of cables from the table-1
  - Connect line & motor leads exactly as per wiring diagram.
  - Terminal screws: M4
  - Tightening Torque: 80-110 N-cm

The Starter is now ready for commissioning.

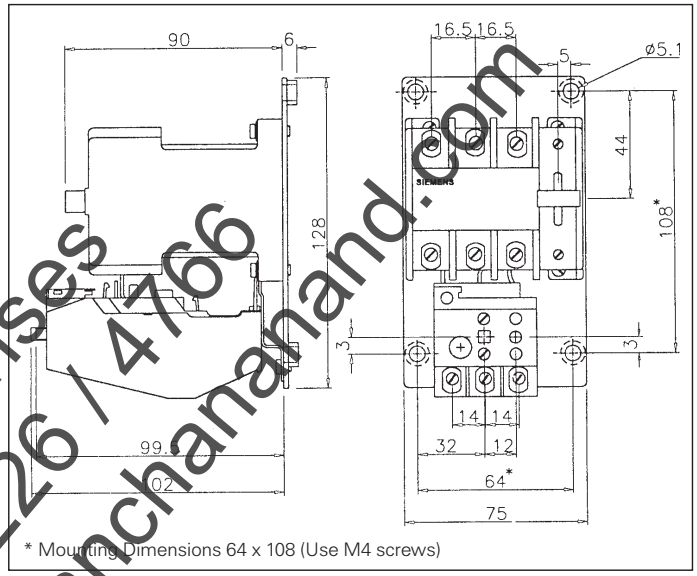


Fig. 1 : Dimensional Details

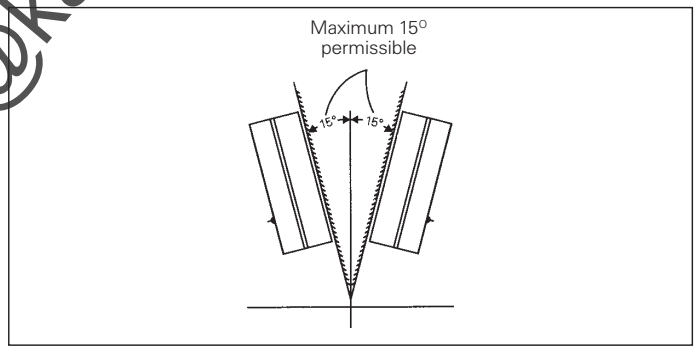


Fig. 2 : Maximum permissible displacement from vertical plane

Commissioning:

Caution:

- **During commissioning or maintenance always ensure that the main supply is disconnected by switching off the main switch.**
- **If the relay trips even when set at the rated motor current the suitability of the starter/relay for the particular application should be checked with the nearest Siemens office.**
- **Setting of 'Auto/hand reset' mode** (Ref.Fig.3)

– In the delivered condition, the relay is set in H=Hand (manual) resetting mode. To change from H=Hand (manual) resetting to A=Automatic (self) mode, press and turn the Blue button on the relay counter clockwise from H to A.

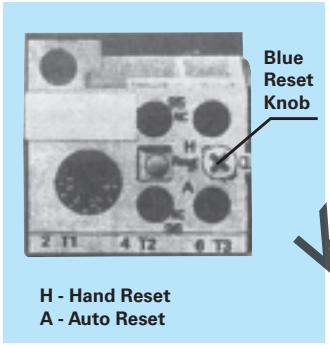


Fig. 3 : Relay Front View

Procedure for setting the overlaod relay :

For closer protection, set the overload relay to actual current as measured by an ammeter.

In the absence of an ammeter, follow the procedure given below:-

– Set the relay to rated current mentioned on the motor name plate.

– Press the 'ON' button of the starter or the green button of the contactor to start the motor and wait till it reaches to normal speed and let it run for approximately 30 minutes on full load.Then gradually reduce the relay setting till it trips.Set the relay at a slightly higher value than this setting.

– Allow the reset time of approximately 4 min before pressing the blue button on the relay to reset it (in case the relay is set in HR mode) or the relay resets on its own after approx 4 minutes after it trips (in case the relay is set in SR mode).

– Restart the motor. If the relay does not trip, consider it to be properly set. If it trips, set it at a little higher value than before and recheck.

– Overload relay characteristics shown in fig. 4 can be used to estimate the average tripping time at different multiples of the set current.

Operating Characteristics

The given characteristics (Fig.4) are average values of all the ranges and sizes of bimetal relays and are mainly intended to indicate the inverse time current characteristics of the same. The tripping times shown are for relays starting from the cold state. At operating temperatures (heated at rated current) these are reduced to about 25% of the value obtained from the characteristics.

Operation:

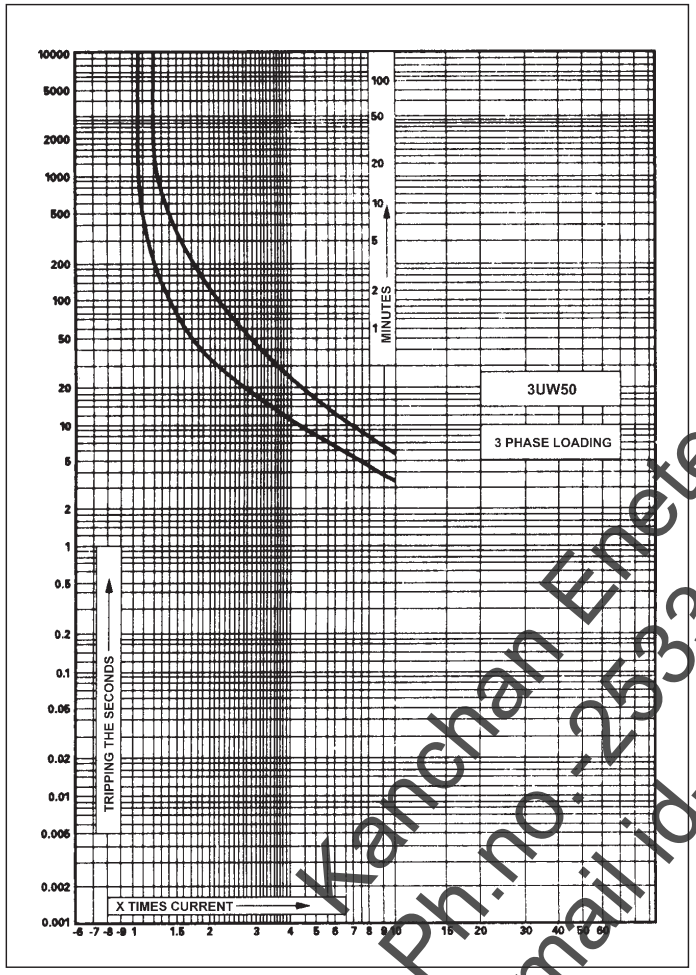
– For starting the motor, install 'ON' push button (Green)-contact element (NO) combination on enclosure cover and wire-up as shown in the wiring diagram. Press Green push button to start the motor.

– For stopping the motor, install 'OFF' push button (Red) - contact element (NC) combination on enclosure cover and wire-up as shown in the wiring diagram. Press Red push button to stop the motor.

For reseting the relay from panel door,use accessory-resseting cord with holder or reset funnel. (refer spares/ accessories list for ordering).

– In case you want the starter to be in 'Self-Reset'mode, the blue knob on the relay is to be pressed and rotated in the anti-clockwise direction, so that it comes in position 'A' and its edge is flush with the surface. In this mode even if the relay trips on overload,it will be automatically reset in a maximum of 4 minutes. The motor can be restarted only after the relay is reset.

– In hand reset mode for resetting, press button marked 'R' if the relay has tripped due to overload (use resetting cord with holder). In this case the motor can be restarted only after you reset the relay. Allow a minimum time of 4 minutes, before resetting it.



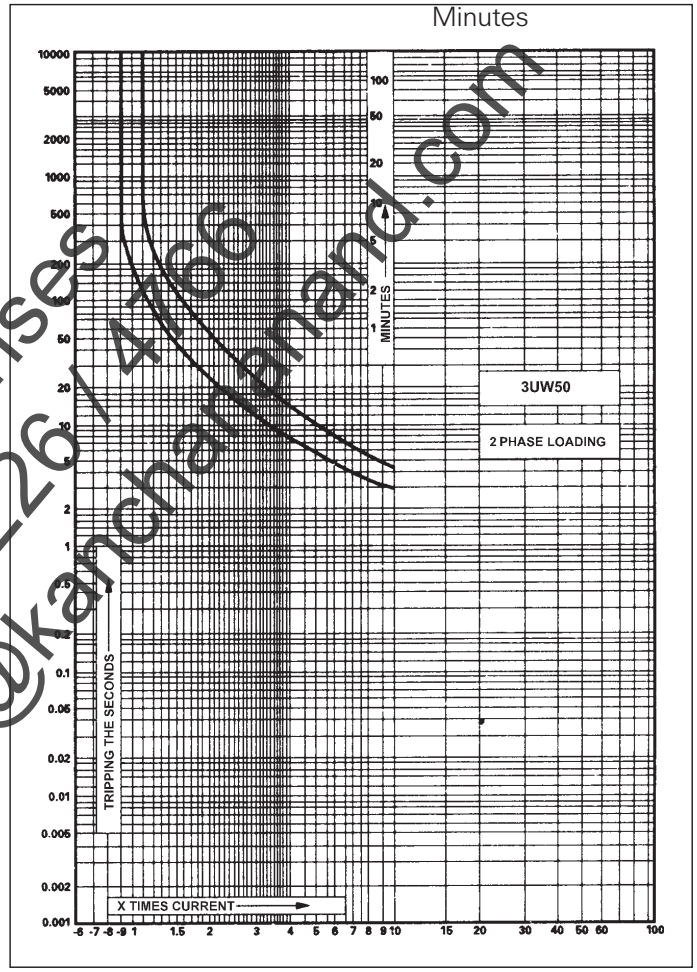


Fig. 4 : Operating characteristics of 3UW50 relays

Note :

It is recommended that relay be set in the 'HR' (hand reset) mode in case of applications involving maintained 'ON' command e.g.use of auto-switch or float switch, etc. in order to avoid damage to the starter/motor.

Maintenance:

Switch off the starter and disconnect the main supply by switching off the main switch before doing any maintenance.

- Keep the interior dust free.
- Re-tighten the terminal screws from time to time.
- No maintenance is needed for overload relay. Please do not open the relay.
- Blackening of silver/alloyed contacts does not affect operational life. If necessary, clean the contacts of contactor with CRC 2-26. Remove the globules with a scrapper or a screw-driver with minimal force. Under no circumstances should the contacts be filed or dressed as it will reduce the electrical life drastically.
- If the contactor hums, clean the magnet pole with a soft cloth/CRC2-26/Chamois leather/ size 00 emry paper if found rusty.
- Replace contacts of the contactor if they are severely pitted or when only 40% of the original contact tip remains.

For details of contactor maintenance refer to our 'Guide to Contactor Installation & Maintenance'.

- **Replacement of Arc Chamber:**

– Remove the existing arc chamber as shown in (Fig.5)

– Replace it by a new arc chamber (refer the spares list for item no.)

– Ensure that the arc chamber is flush with the contactor body.

- **Replacement of overload relay**

Removal

i. Disconnect the wires connected to the relay terminals.

ii. Loosen the outgoing terminal screws of the contactor.

iii. Lift the overload relay vertically upwards to disengage its hook (Fig.6) from the slot of the bracket mounted on the base plate.

iv. Pull the overload relay away from contactor and in outward direction.

– Refixing

i. Select the overload relay of proper range by referring to table A and spares list.

ii. Set the relay either in 'Hand reset ' or 'Auto reset' mode as per your requirement.

iii. Connect the relay terminals (L1 L2 L3) to the contactor terminals(T1 T2 T3).

iv. Ensure that the relay hook (Fig.6-1) is engaged in the slot of the relay mounting bracket (Fig.6-2) and slide the relay inwards till the cover is flush with contactor ribs.(Fig.6-3)

v. Tighten the contactor terminal screws.

vi. Reconnect the disconnected relay wires and check the correctness of the starter wiring.

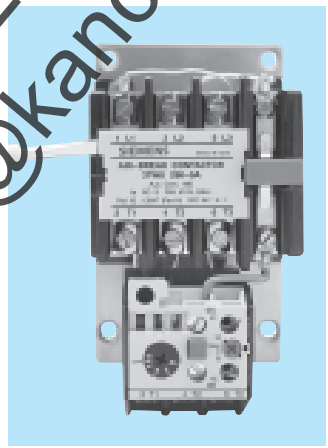


Fig. 5 : Removal of arc chamber

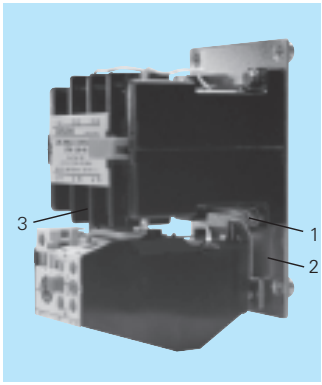


Fig. 6 : Contactor-Birelay Connection

1. Hook for relay engagement
2. Relay mounting bracket
3. Contactor ribs flush with relay edge.

- **Replacement of the Main Contacts:** (Fig.7 & 8)

– Remove the arc chamber. (Fig.5)

– Remove and inspect the contacts.

– When contact tips get eroded and base material is seen, refer spares list to replace contacts.

– Put back the Arc Chamber.

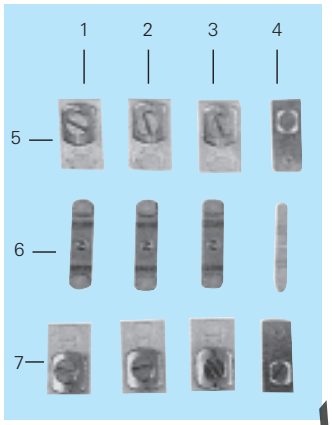


Fig. 7 : Fixed/moving, main/auxiliary contacts inspection.

1, 2, 3 : Main contacts
4 : Auxiliary contacts
5, 7 : Fixed contacts
6 : Moving contacts

- **Replacement of Coil:** (Fig.9)

– Disconnect all the wires connected to the contactor. Disconnect the relay from the contactor and remove the contactor from the base plate by loosening the mounting screws.

– Turn the contactor upside down,unscrew the bottom cover and remove it.

– Ensure that the new coil is of proper voltage. (Table B).

– Ensure all springs are placed at proper location.

– Put back the bottom cover.

Fig. 8(A) : Replacement of moving contacts

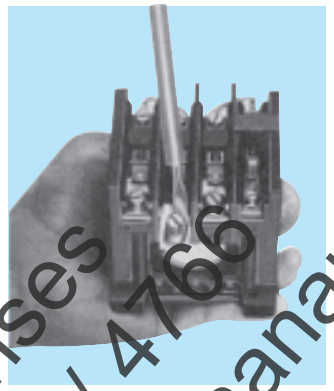


Fig. 8(B) Replacement of fixed contacts

Ensure that the liner (Fig.9-2) is properly put.

Fix the contactor on the base plate, connect the relay and reconnect the disconnected wires and ensure that the connections are proper as per circuit diagram.

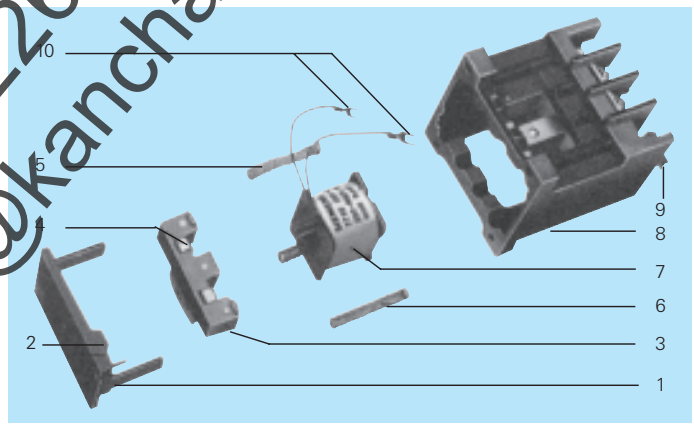


Fig. 9 Replacement of Coil

1 : Bottom Cover
2 : Liner for shock absorption
3 : Fixed Magnet
4 : Bracket Assembly
5 : Return Spring
6 : Return Spring
7 : Coil
8 : Contactor housing along with moving magnet
9 : Aux. Contact
10 : Coil terminals

Table A : Selection Table for RAJA Starter in open execution

1) RAJA DOL Starter for Monobloc pumps

Rating for 4P, 415V, 3Ph, 50hz Motor		Type	Relay Range 3UW50	Back-up Fuse Rating		Recommended Cu cable size (mm^2)
HP#	kW			HRC fuse Rating (A)	Rewirable	
5	3.7	3TW4200-0A*74	6.3-10	25	21 SWG	1.5
-	-	3TW4200-0A*75	8-12.5	25	19 SWG	1.5
7.5	5.5	3TW4200-0A*77	10-16	32	18 SWG	2.5
10	7.5	3TW4200-0A*78	12.5-20	32	18 SWG	4

2) RAJA DOL Starter for Submersible Pumps

Rating for 4P, 415V, 3Ph, 50hz Motor		Type	Relay Range 3UW50	Back-up Fuse Rating		Recommended Cu cable size (mm^2)
HP#	kW			HRC fuse Rating (A)	Rewirable	
5	3.7	3TW 4200-0A*75	8-12.5	25	19 SWG	1.5
7.5	5.5	3TW 4200-0A*77	10-16	32	18 SWG	2.5

* Enter code for coil voltage (Table B)

\# While selecting pl. ensure that rated AC3 current rating (-20 %) of the starter is not exceeded.

Spares List

Sr. No.	Description	Order No.
1	Contactor	3TW0 290-0A * 51 (Refer Table B for*)
2	Birelay	3UW50 02 - ** (Refer Table C for **)
3	Main contact kit (Each set comprises of 6 Fixed Contacts and 3 Moving Contacts)	3TX0 200-0YA0
4	Contact Kit - Single Pole (Each set comprises of 2 fixed contacts and 1 moving contact)	3TX0 200-0YA1
5	Coil	3TX 203-0Y*6 (Refer Table B for *)
6	Cover (Arc chamber)	3TX0 202-0YA0
7	Aux. fixed contact	3TX0 200-1YB0
8	Aux. moving contact	3TX0 200-1YC0

Table B

Voltage	Code
200-400 V	B
130-230V	P
415 V	W
220 V	M

Table C

Relay Range	Code for
6.3 - 10	1J
8 - 12.5	1K
10 - 16	2A
12.5 - 20	2B

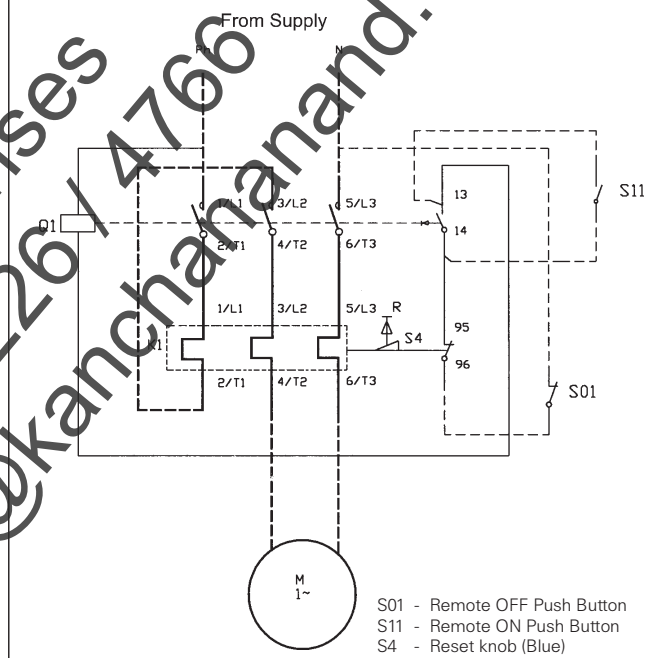
Accessories List

Sr. No.	Description	Order No.
1.	Complete Push-button Unit Green normal actuator + 1NO contact block	3SB1202-0AE01
2.	Complete Push-button Unit Red normal actuator + 1NC contact block	3SB1203-0AC01
3.	Reset Cord with holder 400 mm length 600 mm length	 3UX1015 3UX1016
4.	Resetting plunger & funnel arrangement Plunger Funnel	 3UX1011 3UX1013
5.	Inscription Plates START STOP	 2SY2 507-2A 2SY2 508-2B

Wiring Diagrams:

Raja Direct-On-Line Starter
(For Single Phase Motors)

3TW42 00-0A

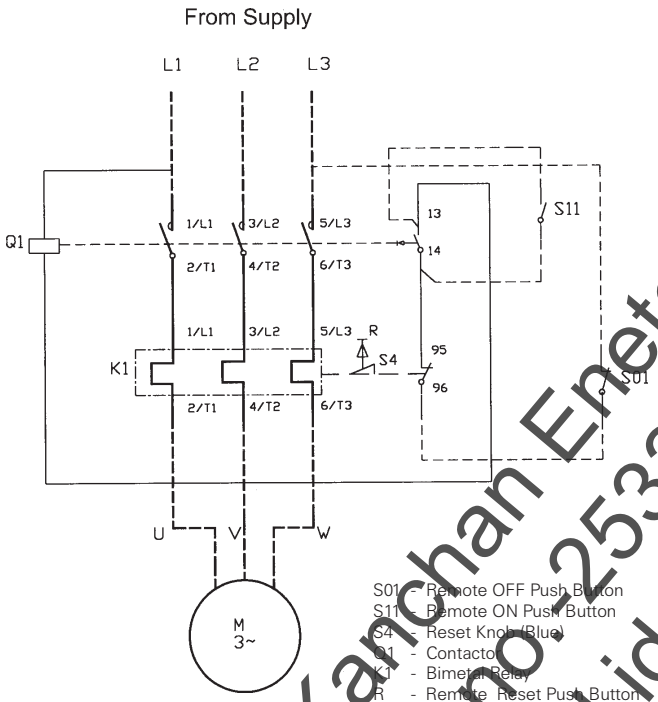


S01 - Remote OFF Push Button
S11 - Remote ON Push Button
S4 - Reset knob (Blue)
Q1 - Contactor
K1 - Bimetal Relay with SPP feature
R - Remote Reset Push Button

* Connect 3/L2 to 2/T1 by cable of suitable size. (max 4 mm²)
* Diagram shows connections made for contactor coils rated at 130-230V, 50Hz and 220V, 50Hz.

RAJA Direct-On-Line Starter
(for Three Phase Motors)

3TW42 00-0A



* Diagram shows connections made for contactor coils rated 200V-400V (wide-band), 415V(320-455V), 50Hz.

* For coils rated 130-230V, 50Hz and 220V, 50Hz disconnect the wire between L3-S01 and connect the neutral of the supply system to the terminal of S01.

Table D

Motor Rating		Max. Full Load Current (Amp)		
		3 Ph, 415V, 4P Squirrel Cage IS 8789 : 1996 Table 4	3 Ph, 415V, 2P Submersible Motor IS 9283 : 1995 Table 2	1 Ph, 240V CSIR or Split-Phase IS 996 : 1979 Table 9
HP	kW			
0.33	0.25	–	–	3.8
0.5	0.37	1.4	–	6
0.75	0.55	1.7	–	7
1	0.75	2.2	–	7
1.5	1.1	2.9	3.25	13
2	1.5	3.8	4.5	18
3	2.2	5.1	6.5	–
5	3.7	8.1	10	–
7.5	5.5	11.4	14.5	–
10	7.5	15.4	19.5	–
12.5	9.3	19.5	25	–
15	11	23	29	–
20	15	32	39	–
25	18.5	38.5	–	–

Note : The above table gives the max. full load current for various motors commonly used. It is recommended that the above table be referred to in conjunction with motor name plate data, before selecting the starter with appropriate relay range.

Notes

Reply Card

Please Affix Stamp

To,

Siemens Ltd.
(Standard Products Division)
Thane Belapur Marg,
Kalwe, Thane - 400601.

Electrician registration form

I have installed starter Type No : _____ / _____

at village _____ district _____

State _____

Motor HP _____ Type of Motor _____

Brand _____

Please register my name for the future updates about your Motor Starter range

My Name : _____

Shop's Name : _____

Address : _____

_____ Pin _____

STD Code : _____ Tel : _____ Fax : _____

Date of Purchase : _____

Date of Installation : _____

Name & address of Siemens Authorised dealer or Siemens Starter House

Name & address of Sub-dealer

Spares List

Sr. No.	Description	Order No.
1	Contactor	3TW0 290-0A * 51 (Refer Table B for*)
2	Birelay	3UW50 02 - ** (Refer Table C for **)
3	Main contact kit (Each set comprises of 6 Fixed Contacts and 3 Moving Contacts)	3TX0 200-0YA0
4	Contact Kit - Single Pole	3TX0 200-0YA1
5	Coil	3TX 203-0Y*6 (Refer Table B for *)
6	Cover (Arc chamber)	3TX0 202-0YA0
7	Aux. fixed contact	3TX0 200-1YB0
8	Aux. moving contact	3TX0 200-1YC0
9	'ON' SPA	3TX0 204-1YA0
10	'OFF' SPA	3TX0 204-1YB0
11	'Reset' SPA	3TX0 204 - 1YR0
12	Contact Holder	3TX0 200-0YD0
13	'ON/OFF' contact Element	3SX1 501 - 1A
14	Switch for HSD starter	3LA0 204 - 4B

Table C

Relay Range	Code for
0.63 - 1	0J
1 - 1.6	1A
1.6 - 2.5	1C
2 - 3.2	1D
3.2 - 5	1F
4 - 6.3	1G
6.3 - 10	1J
8 - 12.5	1K
10 - 16	2A
12.5 - 20	2B

Table B

Voltage	Code
200-400 V	B
190-230V	F
415 V	W
220 V	M

Fig. 11(A) Replacement of moving contacts

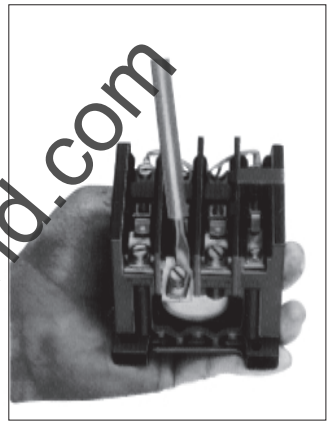


Fig. 11(B) Replacement of fixed contacts

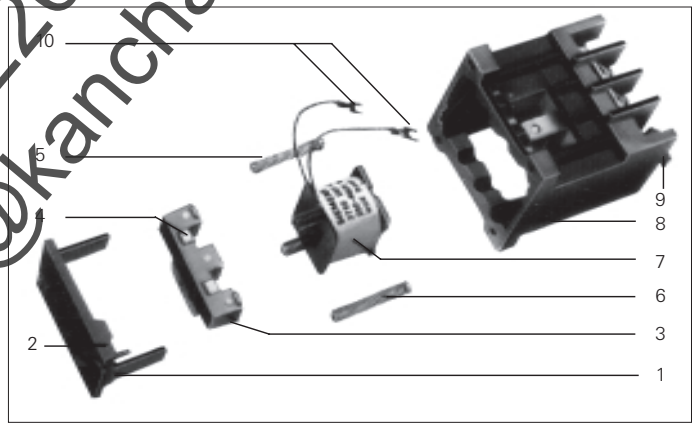
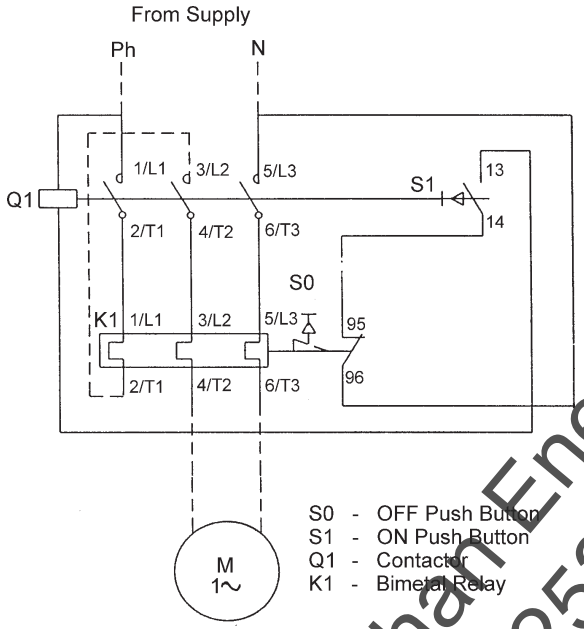


Fig. 12 Replacement of Coil

1 : Bottom Cover
2 : Liner for shock absorption
3 : Fixed Magnet
4 : Bracket Assembly
5 : Return Spring
6 : Return Spring
7 : Coil
8 : Contactor housing along with moving magnet
9 : Aux. Contact
10 : Coil terminals

RAJA Direct-On-Line Starter (for Single Phase connection)

3TW42 90-1A



- Wiring Diagram for Single-Phase Motors

Note :
Connect 3/L2 to 2/T1 by cable of suitable size. (max 4 mm^2)

– Refixing

i. Select the overload relay of proper range by referring to table A and Spares list. Ensure it's blue knob in 'Auto reset' position marked with 'A'.

ii. Connect the relay terminals (T1 T2 T3) to the contactor terminals (T1 T2 T3).

iii. Ensure that the relay hook (fig. 9-1) is engaged in the slot of the bracket (fig. 9-2) welded to the housing and slide the relay inwards till the cover is flush with contactor ribs. (fig. 9.3)

iv. Tighten the contactor terminal screws.

v. Reconnect the disconnected relay wires and check the correctness of the starter wiring as shown on the inside of the front cover.

- **Replacement of main contacts:** (fig. 11)

– Remove the Arc Chamber.

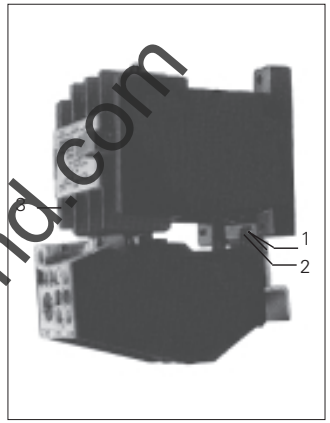
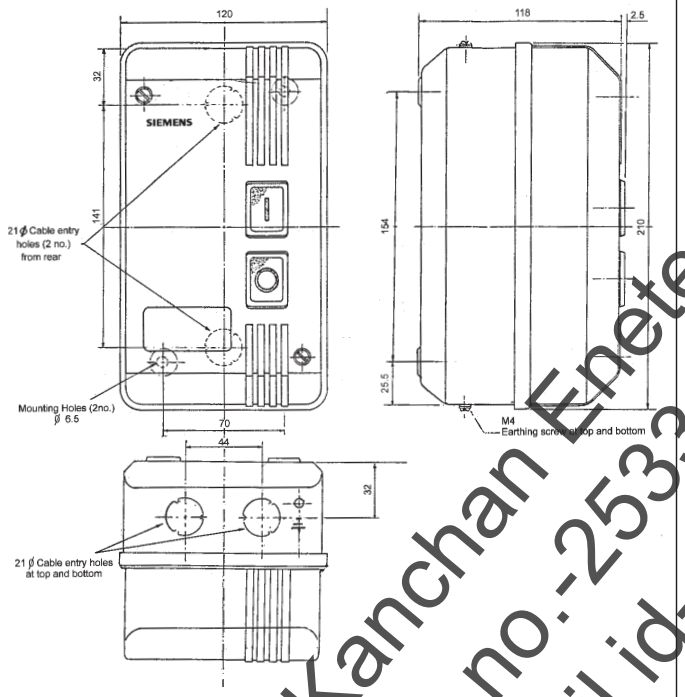


Fig. 9 Contactor - Birelay Connection
1. Hook for relay engagement
2. Relay mounting bracket
3. Contactor ribs flush with relay edge.

Dimensional Drawings:

RAJA Direct-On-Line Starter



* Mounting diamensions 154 x 70

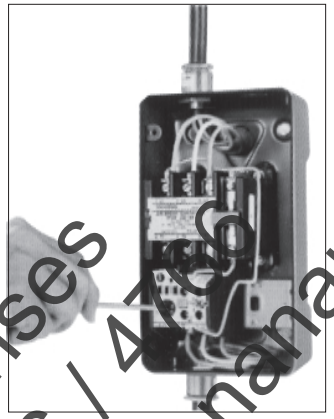


Fig. 5 Setting the relay dial

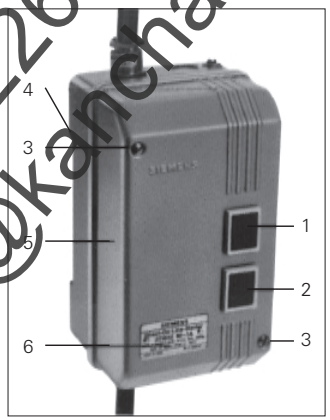


Fig. 6 Starter in closed position
1. 'ON' push button (Green)
2. 'OFF' Push button (Red)
3. Cover fixing screws
4. Housing
5. Cover
6. Name Plate

Operation

- **ON/OFF Operation**

– Switch 'ON' the starter by pressing the green push button (marked 'I') (Fig. 6-1) on the starter cover.

Switch 'OFF' the starter by pressing the red push button (marked 'O') (fig. 6-2) on the starter cover.

- **Reset Operation**

– If the overload relay trips, it resets automatically. (*Allow a reset time of approx. 4 min.)

- It is recommended that the DOL Starter (Self reset type) is not to be used in applications involving maintained 'ON' command. In such applications hand reset type of starter is recommended.

iv. Pull the overload relay away from contactor and in outward direction.

Table D

Motor Rating		Max. Full Load Current (Amp)		
HP	kW	3 Ph, 415V, 4P Squirrel Cage IS 8789 : 1996 Table 4	3 Ph, 415V, 2P Submersible Motor IS 9283 : 1995 Table 2	1 Ph, 240V CSIR or Split-Phase IS 996 : 1979 Table 9
0.33	0.25	–	–	3.8
0.5	0.37	1.4	–	6
0.75	0.55	1.7	–	7
1	0.75	2.2	–	7
1.5	1.1	2.9	3.25	13
2	1.5	3.8	4.5	18
3	2.2	5.1	6.5	–
5	3.7	8.1	10	–
7.5	5.5	11.4	14.5	–
10	7.5	15.4	19.5	–
12.5	9.3	19.5	25	–
15	11	23	29	–
20	15	32	39	–
25	18.5	38.5	–	–

Note : The above table gives the max. full load current for various motors commonly used. It is recommended that the above table be referred to in conjunction with motor name plate data, before selecting the starter with appropriate relay range.

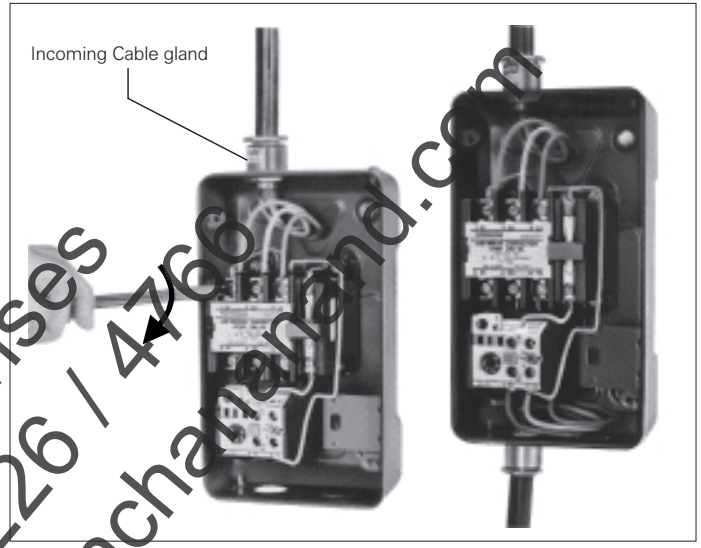


Fig. 3 A.B. Connection of outgoing and incoming cable, using cable gland.

outgoing cable connections. (fig. 2)

- Connect incoming and outgoing cables as follows : (fig. 3)
  - Select correct size of cable from Table-A. (max. cable size allowed is 4 mm^2)
  - Remove approx. 10 mm of insulation.
  - Pass the cable through proper cable gland to avoid ingress of material.
  - Connect the cables and tighten the screws firmly. (Terminal Screws : M4, Stripped Length : 10 mm)
- Set the overload relay scale (fig. 4A-4) using proper screw driver as per the procedure given below : (fig. 5)
  - Set the relay to rated current mentioned on motor name plate.
  - Press green button of the contactor (fig. 4B-7) to start the motor and wait till it reaches to normal speed. Reduce the relay setting till it trips.

Reply Card

Please Affix Stamp

To,

Siemens Ltd.
(Standard Products Division)
Thane Belapur Marg,
Kalwe, Thane - 400601.

Electrician registration form

I have installed starter Type No : 3TW4290-1A _____ /
3LW4290-0A _____

at village _____ district _____

State _____

Motor HP _____ Type of Motor _____

Brand _____

Please register my name for the future updates about your Motor Starter range

My Name : _____

Shop's Name : _____

Address : _____

_____ Pin _____

STD Code : _____ Tel : _____ Fax : _____

Date of Purchase : _____

Date of Installation : _____

Name & address of Siemens Authorised dealer
or Siemens Starter House

Name & address of Sub-dealer

Auto / Hand
Reset

RAJA Direct-On-Line Starter