

RAJA+

Fully Automatic Star Delta Starter 3TE7421

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

RAJA+ Fully Automatic Star Delta Starter

Selection of Starter

- Refer Table 1 for recommended selection of 3TE7 FASD starters.
- FASD Starters are available in 3 frame sizes – FASD1: upto 30HP, FASD2: 40HP & 50HP and FASD3: 75HP submersible pump ratings.

Installation, Operation & Maintenance Instructions

Please read and understand these instructions before installing, operating or maintaining the equipment. Keep for future reference.

	Danger Hazardous voltage can cause death or serious injury. Disconnect power before working on equipment.
	Warning Automatic Motor Restart LMRA has "Auto" mode selection. Use this function with caution, Motor will restart automatically when healthy power is restored back. Reliable functioning of the equipment is only ensured with certified components. Commissioning and maintenance by qualified personnel only.
NOTICE This product has been designed for environment A. Use of this product in environment B may cause unwanted electromagnetic disturbances in which case the user may require to take adequate mitigation measures.	

Complies to standard : IS/IEC 60947-4-1

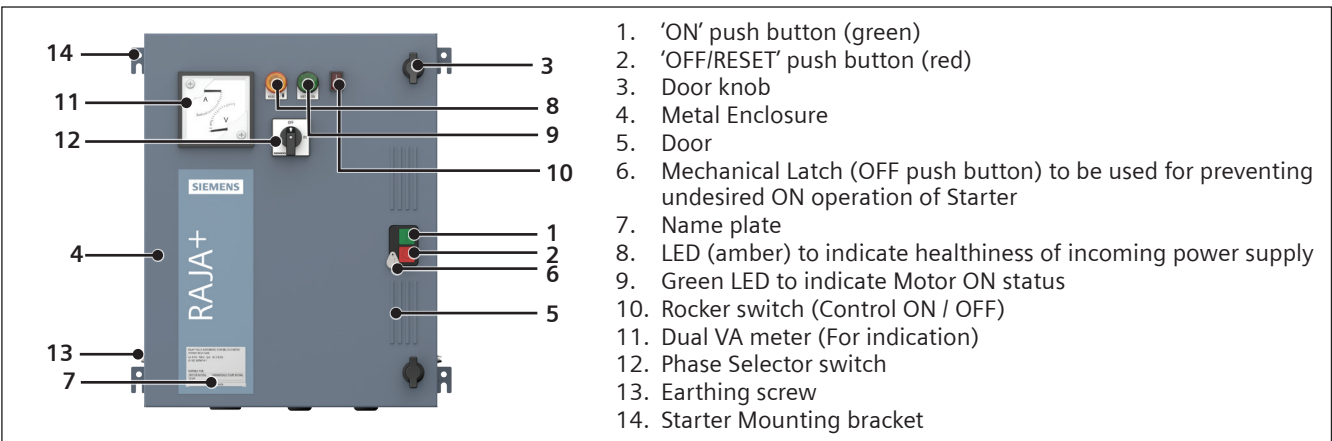


Fig. 1: FASD Starter



Fig. 2: FASD Starter inside view

Installation:

- Open the door by rotating the door locks anticlockwise.
- Mount the starter on a vertical wall / plate free from vibrations with proper nuts and bolts. Refer Fig. 10 for mounting dimensions.
- Remove the rubber grommets for the incoming and outgoing cable connections. (Refer Fig. 2).
- Connect incoming and outgoing cables as follows (Refer Fig. 2):
 - Use proper cable glands to ensure dust proofing. For conduit entry use packed washers.
 - Select correct size of cables from Table 1.
 - Connect line and motor cables exactly as per wiring diagram pasted inside the cover of the starter.
 - Terminate the incoming supply cables on terminal block TB1 & outgoing cables to motor on terminal block TB2, TB3 (Tightening torque - Refer table 2).
 - This is Not applicable for FASD3, since all connections are terminated on incoming & outgoing links.

NOTE: LMRA is set in Manual mode (Factory setting)

- Connect the earthing conductor to terminals marked (earth) on the starter body with torque 1.2 to 1.6Nm. The Starter is now ready for commissioning.
- Initially set the overload relay to 0.58 times the rated motor current.
- Set the timer dial to the nearest value of starting time available on motor name plate. If it is not available, then set the dial to approximately 6-8 secs.
- Close the door by rotating the door locks clockwise.

Commissioning :

For exact setting of timer and overload relay, follow the instruction given below:

Before switching ON recheck all external connections.

- Star-Delta Timer setting for FASD:
 - First Switch ON the Rocker switch (Control On/Off).
 - Start the motor by pressing the 'ON' button shown in Fig. 1.
 - Measure the time taken by the motor to nearly reach rated speed or steady state current condition (indicated when the motor reaches a steady hum).

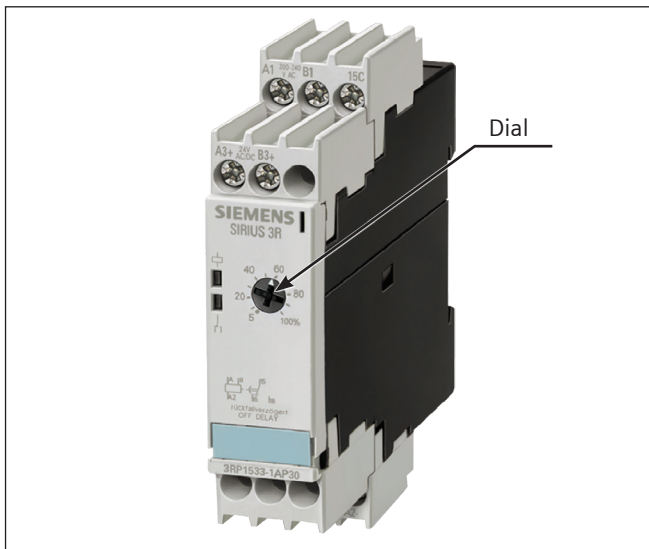


Fig. 3: Timer Adjustment

- Stop the motor by OFF button shown in fig 1.
- Open the door & Set the timer to this measured value by rotating the dial shown in Fig. 3.
- Overload relay setting:
 - For closer protection set the overload relay to actual phase current as measured by an ammeter. In the absence of an ammeter, use the procedure given below:
 - Start the motor and let it run for 30 mins. Then gradually reduce the relay settings till it trips. Set the relay at a slightly higher value than this setting.
 - Overload relay characteristics (Refer service manual A5E50797230A) can be used to estimate the average tripping time at different multiples of set current.
 - Allow a reset time of approx. 4 min. before pressing the blue knob on the relay to reset it.
 - Restart the motor after some time. If the relay does not trip then consider it to be properly set. If the relay trips, set at a little higher value than before and recheck.
- Close the front door.

Caution

- **During commissioning or maintenance always ensure that the main supply is disconnected by switching off the main switch & Rocker switch.**
- **In the case of FASD starters under no circumstances should the relay be set higher than the phase current i.e. 0.58 times the rated current on the motor nameplate.**
- If the relay trips even when set at rated motor current the suitability of the starter/relay for the particular application should be checked with the nearest Siemens office.

Operation:

- Ensure the door is locked.
- Rotate the Mechanical Latch away from OFF push button.
- Switch On the rocker switch.
- Check the status of amber LED. Wait till amber LED is continuously ON then only proceed.
- Depending upon Selector switch knob position for phase selection, Indication of incoming power supply voltage can be seen on Dual VA meter.
- For starting the motor, press Green push button marked 'I' (Fig. 1).
- Line current of R phase is indicated by Dual VA meter.
- Motor is ON when green LED is ON.
- For stopping the motor press Red push button marked 'O' (Fig. 1).
- For LMRA Auto / Bypass modes refer troubleshooting guide A5E50797230A.

Reset Operation

- If the overload relay trips, Reset manually. (Allow a reset time of approx. 4 min.)

Maintenance:

- Switch off the starter and Put Latch on the OFF push button, (marked 'O'). **Disconnect the main supply by switching the main switch & Rocker Switch Off before doing any maintenance.**
- Keep the interior dust free.
- Re-tighten the terminal screws from time to time as per specified torque in table 2.
- No maintenance is needed for overload relay. Please do not open the relay.
- Replace contacts of the contactor if they were severely pitted or when only 40% of the original contact tips remains.
- Replacement of Contactor Or Individual mounted Overload Relay (Refer Fig. 4):
 1. Slightly loosen the outgoing terminal screws of the relay.
 2. Disconnect the wires connected to the relay terminals.
 3. Slightly loosen the outgoing terminal screws of the line contactor (For contactor mounted relay) / adaptor plate (For individual mounted relay).

4. Follow instructions given in Fig. 4 (For contactor mounted relay) / Fig. 5, 6 (For individual mounted relay) for removal of relay.
5. Select a proper relay exactly as per the original.
6. Connect the relay terminals (L1, L2, L3) to (T1, T2, T3) of Q1 line contactor (For contactor mounted relay) / adaptor (For individual mounted relay).
7. Connect the relay terminals to Terminal block TB2.

Care should be taken to fix the relay terminals & relay to contactor / adaptor in the exact position shown in Fig. 4, 5, 6.

8. Ensure that relay hook is engaged in the slot on contactor or adaptor.
9. Tighten the contactor / adaptor terminal screws.
10. Re-connect the disconnected wires and check connections by referring to the wiring diagram.

For more Technical details like LMR-A wiring, operating sequence, mounting details etc., refer Installation & Troubleshooting guide no. A5E50797230A.

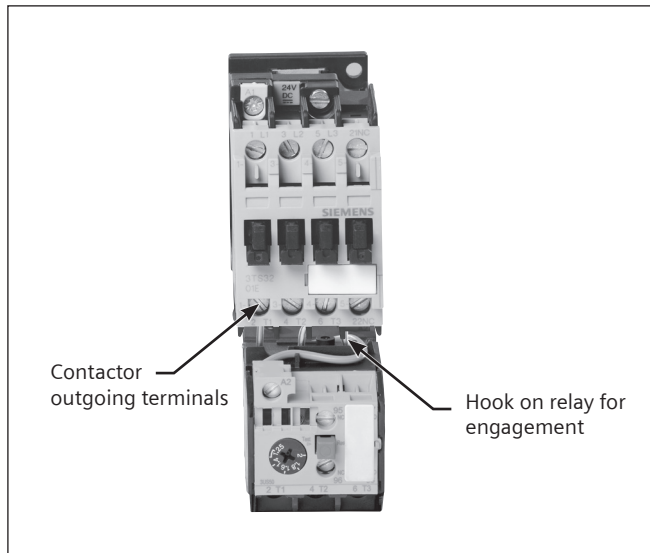


Fig. 4: Contactor -Relay Connection Replacement of coil

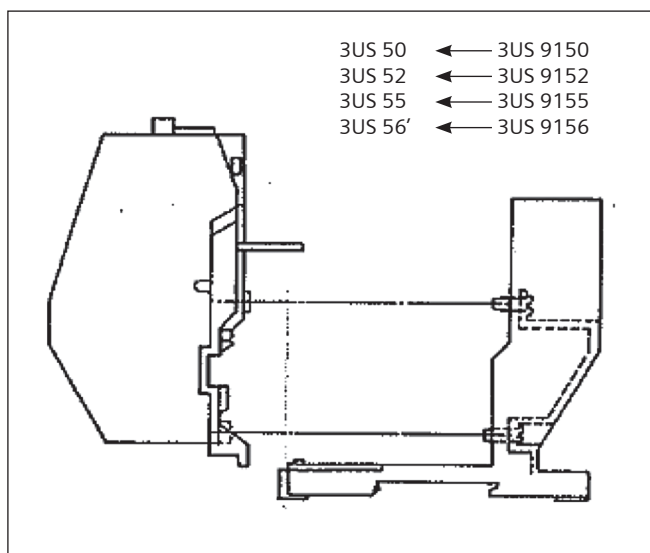
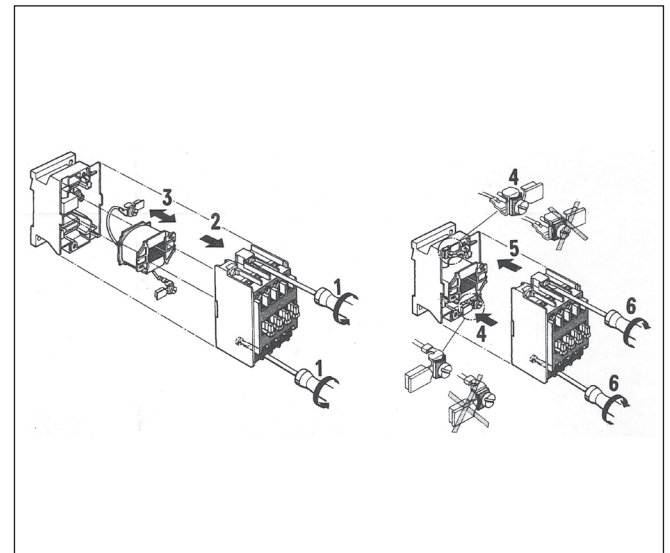
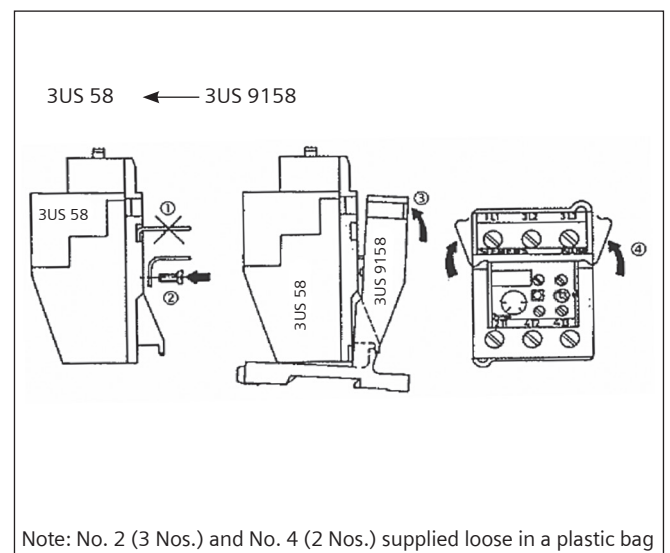


Fig. 5: Adaptor plate for Individual mounting of Bi-relays
3US50/52/55/56:3US9150/3US9152/3US9155/3US9156



Note: No. 2 (3 Nos.) and No. 4 (2 Nos.) supplied loose in a plastic bag

Fig. 6: Adaptor plate for Individual mounting of Bi-relays
3US58:3US9158

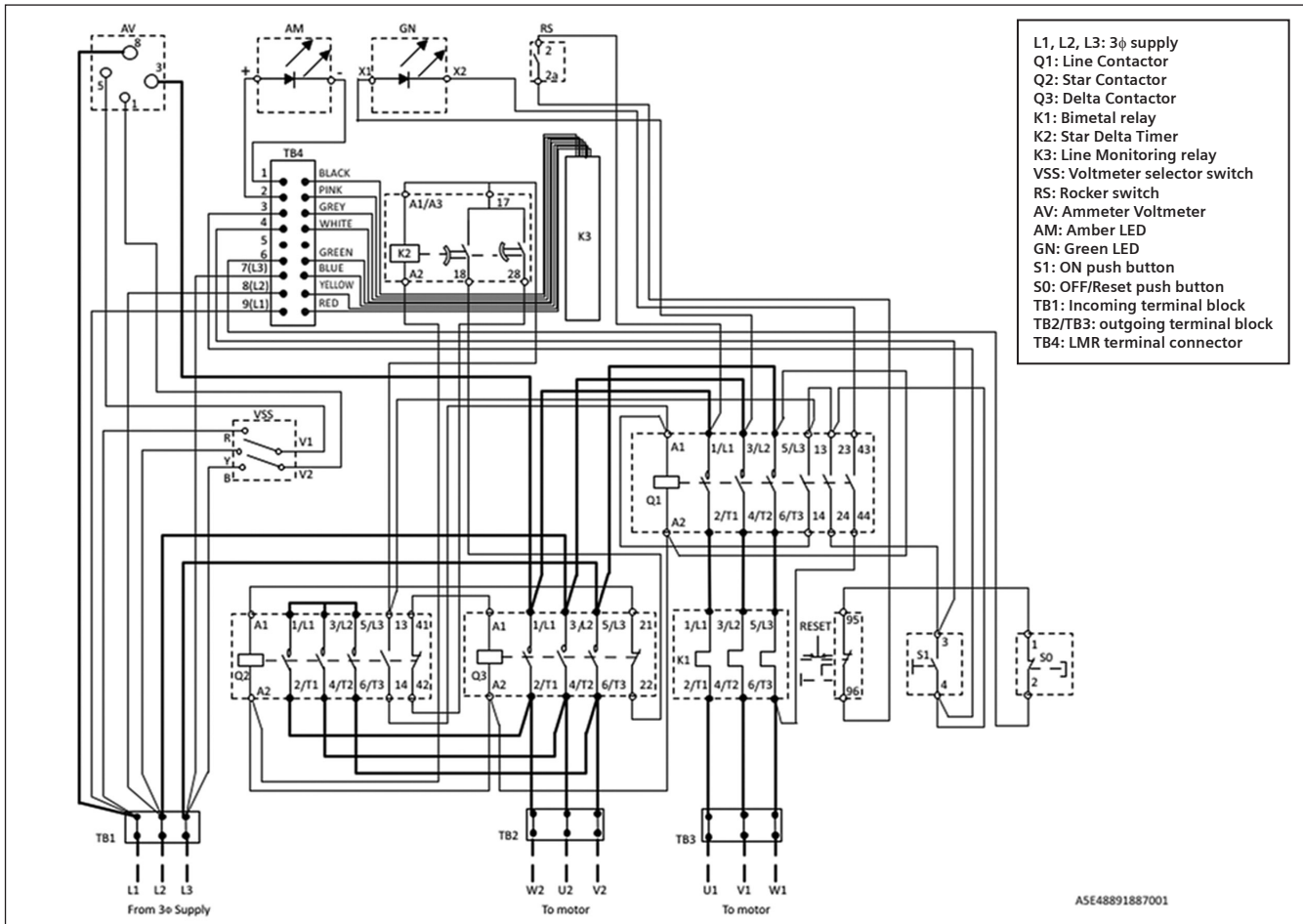


Fig. 7: Wiring Diagram FASD1

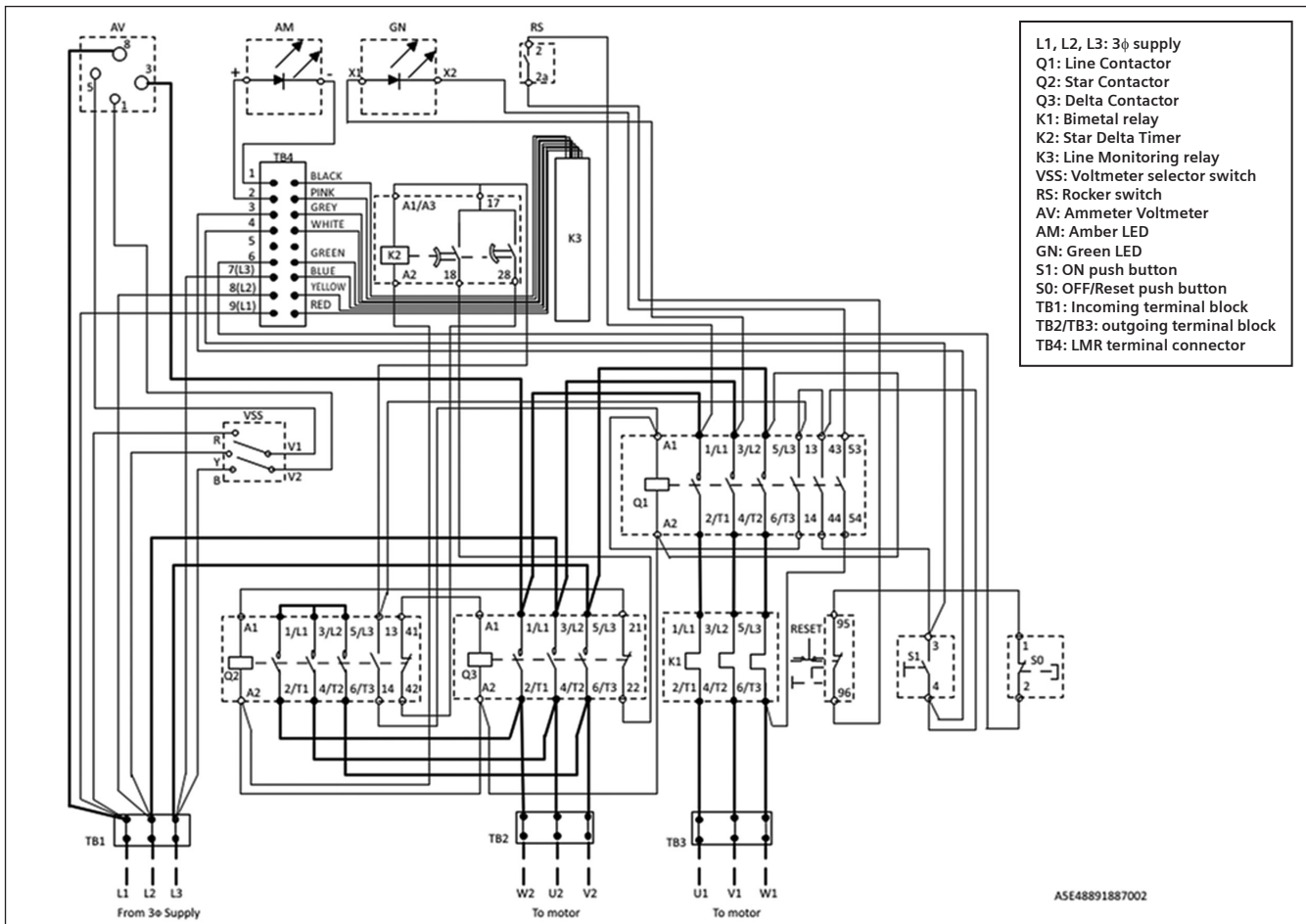


Fig. 8: Wiring Diagram FASD2

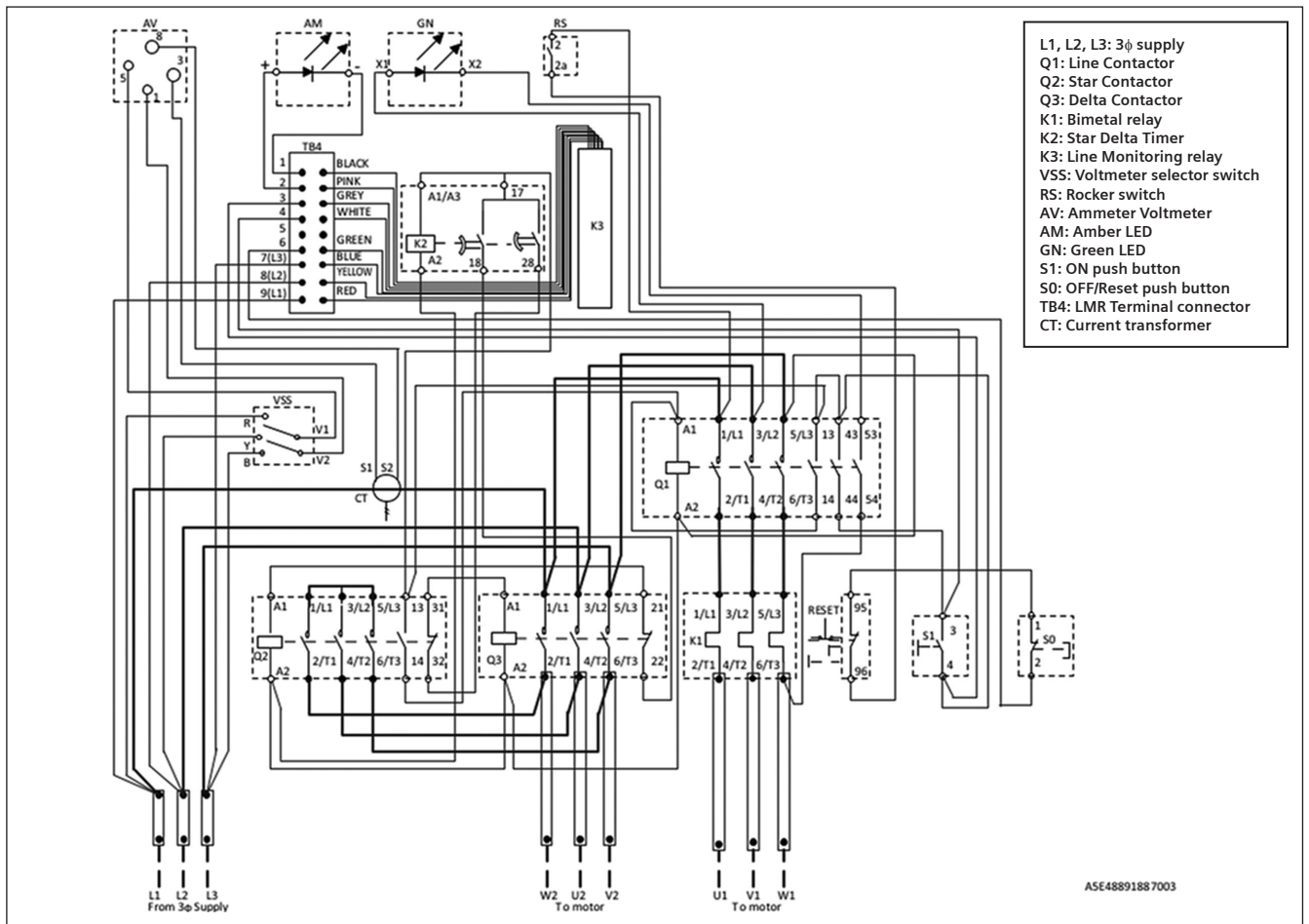


Fig. 9: Wiring Diagram FASD3

Table 1:

Motor Rating At 415V 3ph 50Hz HP/kW		Type	Starter MLFB	Line/Delta Contactor MLFB	Star Contactor MLFB	Thermal		Relay	IL/IpH AC-3 [A		HRC Fuse rating (A) *	Cu cable size (mm²)	
Motor	Submersible Pump					Overload Relay	MLFB	range (A)	Motor	Submersible Pump		Incoming from supply	Outgoing to Motor
10 / 7.5	–	FASD1	3TE7421-1JC21-1A##	3TS3110-0A##-08K	3TS3010-0A##-08K	3UW5102-1J	3UW5102-1J	6.3–10	15.4 / 8.9	–	25	2.5	1.5
–	10 / 7.5		3TE7421–1KC21-1A##	3TS3210-0A##-08K	3TS3010-0A##-08K	3UW5102-1K	3UW5102-1K	8–12.5	–	19.5 / 11.2			
15 / 11	–		3TE7421-2AC24-1A##	3TS3300-0A##-08K	3TS3110-0A##-08K	3UW5202-2A	3UW5202-2A	10–16	23 / 13.3	–	32	4	2.5
17.5 / 13	15 / 11		3TE7421-2BC24-1A##	3TS3300-0A##-08K	3TS3110-0A##-08K	3UW5202-2B	3UW5202-2B	12.5–20	26 / 15	29 / 16.7	32	6	2.5
20 / 15	–		3TE7421-2BC26-1A##	3TS3300-0A##-08K	3TS3110-0A##-08K	3UW5202-2B	3UW5202-2B	12.5–20	32 / 18.5	–	40	6	2.5
25 / 18.5	–		3TE7421-2CC27-1AZ8	3TS3500-0AZ8-08K	3TS3210-0AZ8-08K	3US5600-2C8K	3US5600-2C8K	16–25	36 / 20.8	–	63	10	4
30 / 22	20 / 15		3TE7421-2DC26-1AZ8	3TS3500-0AZ8-08K	3TS3300-0AZ8-08K	3US5600-2D8K	3US5600-2D8K	20–32	45 / 26	39 / 22.5		10	6
40 / 30	30 / 22		3TE7421-2RC28-1AZ8	3TS3500-0AZ8-08K	3TS3400-0AZ8-08K	3US5600-2R8K	3US5600-2R8K	32–40	59 / 34.1	57 / 32.9	80	16	10
50 / 37	–		3TE7421-8MC33-1A\$\$	3TS4722-0A\$\$-08K	3TS3500-0A\$\$-08K	3US5600-8M8K	3US5600-8M8K	36–45	71 / 41	–			
–	40 / 30		3TE7421-2TC31-1A\$\$	3TS4722-0A\$\$-08K	3TS3500-0A\$\$-08K	3US5800-2T8K	3US5800-2T8K	40–57	–	76 / 43.9	160	25	10
–	50 / 37	FASD2	3TE7421-2TC33-1A\$\$	3TS4722-0A\$\$-08K	3TS3600-0A\$\$-08K	3US5800-2T8K	3US5800-2T8K	40–57	–	85 / 49.1			
75 / 55	–		3TE7421-2PC35-1A\$\$	3TS4822-0A\$\$-08K	3TS4722-0A\$\$-08K	3US5800-2P8K	3US5800-2P8K	50–63	104.4 / 60.3	–	160	35	16
–	75 / 55		3TE7421-5CC35-1A\$\$	3TS5122-0A\$\$-08K	3TS4822-0A\$\$-08K	3US5800-5C8K	3US5800-5C8K	85–105	–	158 / 91.2	200	70	35

* Recommended Max. Back-up HRC Fuse rating, SIEMENS Make type 3NA7 – 500V

Selection of contactor coil and LMRA

Code	Contactor coil voltage code	Coil voltage (VAC)	Line Monitoring Relay	Timer
##	Z6	200–400	7UG0613-0FE20	3RP1576-1NP208K
##	Z8	260–460	7UG0613-0FF20	3RP1576-1NM208K
\$\$	R0	332–457	7UG0613-0FH20	3RP1576-1NM208K
\$\$	Q0	304–418	7UG0613-0FG20	3RP1576-1NP208K

Table 2: Terminal torque values

Sr. No.	Type	Size	Torque (Nm)
1	Terminal block 30A	M4	0.8–1.4
2	Terminal block 60A	M5	1.5–2.1
3	Terminal block 100A	M6	2.5–3.0
4	Dual VA Meter 200A – Current terminals	M4	1.2
5	Dual VA Meter 30A – Current terminals	M4	1.2
6	Dual VA Meter 60A – Current terminals	M6	2.5
7	Dual VA Meter 100A – Current terminals	M8	5.0
8	CT 200/5A	M3.5	0.9
9	Power Link	M6	4–6
10	Selector Switch 3LD4	M3	0.5
11	Multiway strips	M3	0.4–0.6
12	Indicating light – Amber/Green	M3	0.8–0.9

Table 3: Spares list

Sr. No.	Description	Order No.
1	Contactator	3TS3210-0AZ6-08K
2	Contactator	3TS3110-0AZ6-08K
3	Contactator	3TS3010-0AZ6-08K
4	Contactator	3TS3210-0AZ8-08K
5	Contactator	3TS3010-0AZ8-08K
6	Contactator	3TS3300-0AZ6-08K
7	Contactator	3TS3300-0AZ8-08K
8	Contactator	3TS3110-0AZ8-08K
9	Contactator	3TS3500-0AZ8-08K
10	Contactator	3TS4722-0AR0-08K
11	Contactator	3TS3500-0AR0-08K
12	Contactator	3TS3600-0AR0-08K
13	Contactator	3TS4722-0AQ0-08K
14	Contactator	3TS3500-0AQ0-08K
15	Contactator	3TS4822-0AQ0-08K
16	Contactator	3TS3600-0AQ0-08K
17	Contactator	3TS5122-0AR0-08K
18	Contactator	3TS4822-0AR0-08K
19	Contactator	3TS3400-0AZ8-08K
20	Contactator	3TS5122-0AQ0-08K

Sr. No.	Description	Order No.
21	Contactator	3TS3210-0AZ6-08K
22	Thermal Overload Relay	3UW5102-1J
23	Thermal Overload Relay	3UW5102-1K
24	Thermal Overload Relay	3UW5202-2A
25	Thermal Overload Relay	3UW5202-2B
26	Thermal Overload Relay	3US5600-2C8K
27	Thermal Overload Relay	3US5600-2D8K
28	Thermal Overload Relay	3US5600-2R8K
29	Thermal Overload Relay	3US5600-8M8K
30	Thermal Overload Relay	3US5800-2T8K
31	Thermal Overload Relay	3US5800-2P8K
32	Thermal Overload Relay	3US5800-5C8K
33	Coil for 415V (3TS35/36)	3TY7443-0AR0
34	Coil for 380V (3TS35/36)	3TY7443-0AQ0
35	Coil for 200-400V	3TY7403-0AZ6
36	Coil for 260-460V (Z8)	3TY7403-0AW415
37	Coil for 415V (3TS47/48)	3TY7463-0AR0
38	Coil for 380V (3TS47/48)	3TY7463-0AQ0
39	Coil for 415V (3TS51)	3TY7503-0AR0
40	Coil for 380V (3TS51)	3TY7503-0AQ0
41	1NO Contact Block	3SB5420-0B
42	1NC Contact Block	3SB5420-0C
43	Green LED	3SB5285-6HE06
44	Amber LED	3SB5285-6HL33
45	LMRA for 200-400V	7UG0613-0FE20
46	LMRA for 260-460V	7UG0613-0FF20
47	LMRA for 380V	7UG0613-0FG20
48	LMRA for 415V	7UG0613-0FH20
49	Timer	3RP1576-1NM208K
50	Timer	3RP1576-1NP208K
51	Add on block	3TX4010-2A
52	Add on block	3TX4001-2A
53	Add on block	3TY7561-1KA00-08K
54	Add on block	3TY7561-1AA00-08K
55	Phase selector switch	3LD4001-4DC30-0RC0

NOTE: Contact sales for ON & OFF Push Button, Terminal block 30A/60A/100A, Dual VA meter, Doorknob, Rocker switch, Current transformer (200/5A).

For more Technical details like LMR-A wiring, operating sequence, mounting details etc., refer Installation & Troubleshooting guide no. A5E50797230A.

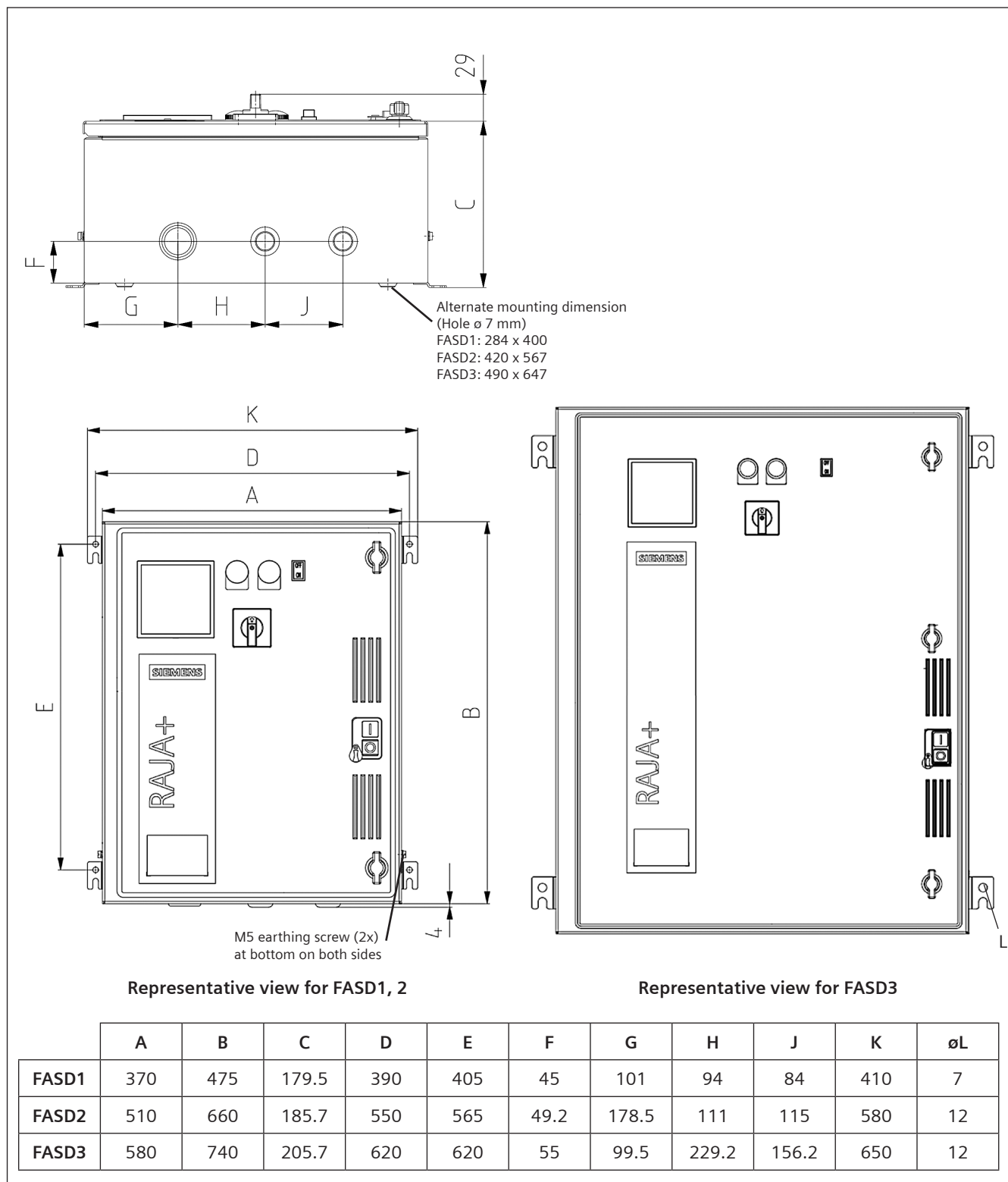


Fig. 10: Dimensional Drawing

Disposal

Siemens products are environment friendly, which predominantly consist of recyclable materials. For disposals we recommend disassembling and separation into following materials:

METALS: Segregate into Ferrous types for recycling through authorized dealer.

PLASTICS: Segregate as per material type for recycling through authorized dealer. Because of the long lifetime of Siemens Products the disposal guidelines may be replaced by other national regulations when taking the product out of service. The local customer care service is available at any time to answer disposal-related questions.