

The need for continuous power supply and its reliability has increased rapidly over the years, especially in all those areas where uninterrupted power supply is a must. Modern systems are power dependent. Their complexity has increased as continuous information and communications are needed to control automated process, be in industries, commercial complexes, hospitals, hotels or even modern residences.

The need, as such, for independent stand by power system has therefore increased manifold. The power distribution, control, monitoring and protection of stand by power system needs to be integrated. Stand by generator systems, for example, are required to cater to :-

- **Sensitive Loads** are supplied by UPS systems. The period of non-availability of power, before the stand by supply takes over, is bridged by battery banks. Typical loads are computers, hospital equipments, micro processor controlled industrial machines etc.
- **Critical Loads** mostly involve stand by generator systems which supply power to lighting systems, air conditioning, elevators etc in Airports, Hotels and commercial complexes.
- **Essential Loads** also use stand by generator systems mostly in process industries as they relate to high restarting times or high down times.

Automatic transfer from main supply to stand by supply is vital for all the above kinds of loads.

In the event of power failure, the stand by power is usually expected to take over automatically. Electrical starting equipment, battery bank and diesel generator are required for the automatic operation.

The automatic transfer is achieved mostly by automatic mains failure systems. The process of onload transfer has to be monitored & controlled for a smooth Changeover and within safety limits of all elements of the system. This is achieved by Automatic Transfer Switch (ATS).

Range

Current rating from 100A to 630A in three frame sizes in three pole and four pole execution.

Specification

Conforms to IEC:60947-1 and IEC:60947-6-1 / IS:13947-1.

Features

- High speed transfer
- Superior making & breaking capacity
- Compact & light weight design
- Positive indication through flag indicator
- Neutral point transfer
- Liberal terminals
- Phase barriers

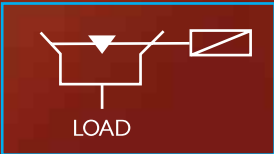


INSTALINE

Automatic Transfer Switch



101



CONSTRUCTION

The Switch comprises of upto four symmetrical poles coupled with the Main Operating Mechanism. The switching mechanism is quick make, quick break type. Load terminals are given on the Lower side but can also be provided on the upper side.

Contact Mechanism

The contact system is housed in a frame made of Polyester reinforced glass material. Each pole has two independent set of Moving contact assemblies for Main & standby supply and one Fixed contact assembly for the common outgoing load terminals. The Moving assemblies are mechanically operated by Cams when rotated by the Main Operating Mechanism. Moving Contacts make on to Fixed Contacts under constant pressure with backup spring. Main Contacts are made of Silver-Tungsten to ensure anti-weld characteristics. The Arc Chute plates placed in the path of contact, efficiently quench the Arc and there by enhance the life of the contacts.

Main Operating Mechanism

The main mechanism independently actuates two sets of Cam linkages, which in turn operate the two independent moving contact assemblies.

The closing command is through a Solenoid Coil supplied with 220V AC. The operating mechanism always responds by closing on the main supply side and not on to standby supply side, when both supplies are present.

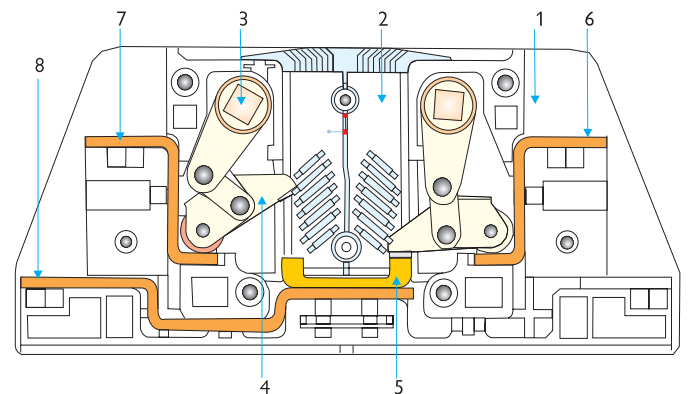
The tripping coil, when energised, is used to bring the ATS to OFF / Neutral position.

Closing on to the standby supply is achieved through the selective coil. The energisation of selective coil, disengages

the main mechanism and prevents closing on to the main supply. The solenoid coil can then close the second set of moving contacts on to the standby supply.

The moving contact mechanism of the main supply and the standby supply are inherently mechanically interlocked through a double throw arrangement, which ensures that at no point of time two supplies are paralleled.

Cross Sectional View of Single Pole of ATS



- 1 Frame
- 2 Housing for Arc Chute
- 3 Operating Shaft for Contacts
- 4 Moving Contact
- 5 Fixed Contact
- 6 Main Supply - Incoming Terminals
- 7 Standby Supply - Incoming Terminals
- 8 Common outgoing - Load Terminals

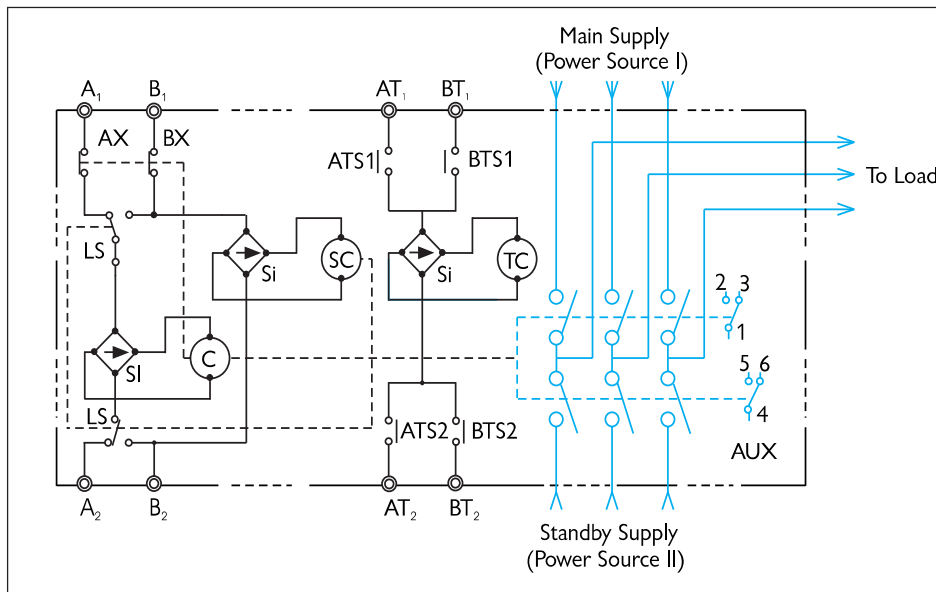


1. Manual Operating Handle
2. Earthing Terminal
3. Name Plate
4. Trip Button
5. Selector (Source-II)
6. On / Off Indicators (Source I & II)
7. Main Supply Terminals
8. Arc Extinguishing Chambers
9. Auxilliary Switch (2 nos.)
10. Standby Supply Terminals
11. Control Circuit Terminal Block
12. Terminals For Load
13. Actuator For Closing Coil
14. ATS Controller Unit
15. Control Wiring
16. ATS Protection Unit (optional)

OPERATION (AUTOMATIC)

In the event of main supply being available, the ATS can be instantaneously switched ON, by the closing coil C, through terminals A_1, A_2 , from its OFF / Neutral position.

If the ATS is ON at the standby supply position, then it is first tripped by the trip coil TC, through terminals $BT_1 - BT_2$. This ensures that the two sources of supply are not paralleled. A suitable external control circuit will ensure this, as shown in circuit diagram for Automatic Instantaneous Changeover mode.



The Auxiliary Switches AX or BX, disconnect the closing coil C, once the ATS is ON, thereby the power consumption of the coil C is zero, when the ATS is closed.

To switch the ATS to standby supply, the selective coil SC is first energised. Then the closing coil C is powered through limit switches LS and terminals B_1, B_2 .

The Trip Coil TC, can be energised through $AT_1 - AT_2$ or $BT_1 - BT_2$ to switch off the main supply or standby supply.

OPERATION (IN EMERGENCY)

In an emergency, the ATS can be operated manually, but as an off-load switch only.

Close on to Main Supply

A manual handle rotates the operating shaft by about 45° in anticlockwise direction, to achieve closure, under off-load conditions.

Close on to Standby Supply

Closure on to standby supply side is achieved, when the "selective" mode is continuously pressed and the manual handle rotates the operating shaft by about 45° in anticlockwise direction.

Trip

Tripping can be achieved manually by pressing momentarily through the "Trip Button".



Closing ATS manually to source-I
Switch to source-I (mains) by rotating the handle upwards through an angle (approximately 45°)

Closing ATS manually to source-II

1. Keep selector pressed using a screwdriver through the selector hole as shown
2. Switch to source-II (mains) by rotating the handle upwards through an angle (approximately 45°)



TECHNICAL INFORMATION



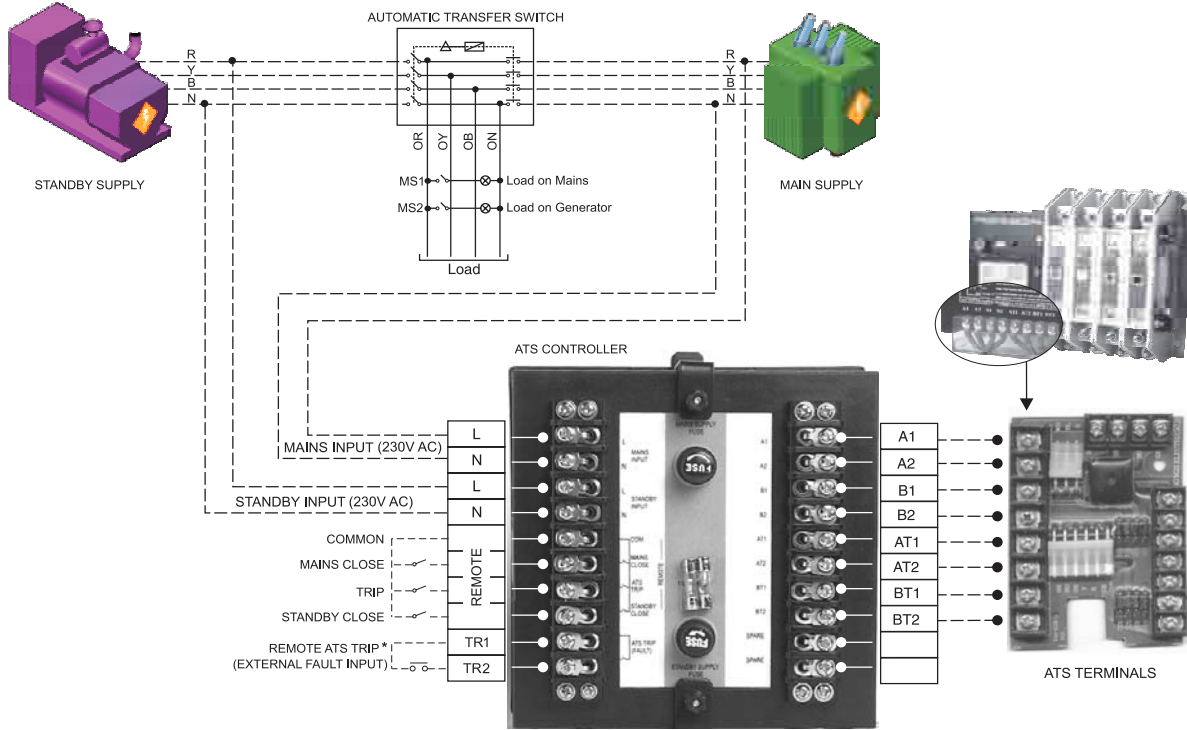
Frame Size		TNFO1		TNFO2		TNFO3	
Rated Operational Current I _e	A	100	160	200	315	400	630
No. of Poles		3P / 4P	3P / 4P	3P / 4P	3P/4P	3P / 4P	3P / 4P
Rated Insulation Voltage U _i	V	1000	1000	1000	1000	1000	1000
Rated Operational Voltage U _e	V	440V AC/125V DC		440V AC / 125V DC		440V AC / 125V DC	
Rated frequency	Hz	50	50	50	50	50	50
Class		PC	PC	PC	PC	PC	PC
Utilization Category		AC 31A	AC 31A	AC 31A	AC31A	AC 31A	AC31A
Dielectric Strength	KV	5	5	5	5	5	5
Rated Impulse withstand Voltage U _{imp}	KV	10	10	10	10	10	10
Rated making capacity at 440V (Cosφ = 0.80)	A	1000	1600	2000	3150	4000	6300
Rated breaking capacity at 440V (Cosφ = 0.80)	A	800	1280	1600	2520	3200	5040
Rated short time withstand current (1 sec)	KA _{rms}	5	7	10	12	12	15
Fuse protected S/C withstand current	KA _{rms}	80	80	80	80	80	80
Rated Short circuit making capacity	KA _{rms}	12.5	17.5	25	30	30	37.5
Mech. Life (No. of ops.)		50,000	50,000	40,000	40,000	30,000	30,000
Elect. Life (No. of ops.)		15,000	15,000	12,000	12,000	10,000	10,000
Switching frequency (ops. per Hr)		120	120	120	120	120	120
Terminal Position		Front	Front	Front	Front	Front	Front
Terminal Capacity - Cu (cable)	mm ²	35	70	95	185	240	—
Al (cable)	mm ²	50	95	150	240	300	—
Busbar	mm	—	—	—	—	40 x 5 x 2	40 x 8 x 2
Weight 3P Kg		8.3	8.7	10.5	11.0	18.0	19.5
4P Kg		9.3	9.7	11.5	12.0	21.0	22.5
Mounting		Vertical	Vertical	Vertical	Vertical	Vertical	Vertical
Coil							
Operating Voltage	V	200 / 220	200 / 220	200 / 220	200 / 220	200 / 220	200 / 220
Operating Current	A						
Main Coil 3P / 4P		3.0 / 3.5	3.0 / 3.5	4.0 / 4.5	4.0 / 4.5	8.0 / 10.5	8.0 / 10.5
Trip Coil		0.5	0.5	0.5	0.5	0.7	0.7
Operating Time	(ms)						
Main Power Source	Make	55	55	55	55	60	60
	Break	20	20	20	20	25	25
Standby Power Source	Make	80	80	80	80	90	90
	Break	20	20	20	20	25	25

3 P - Three Pole

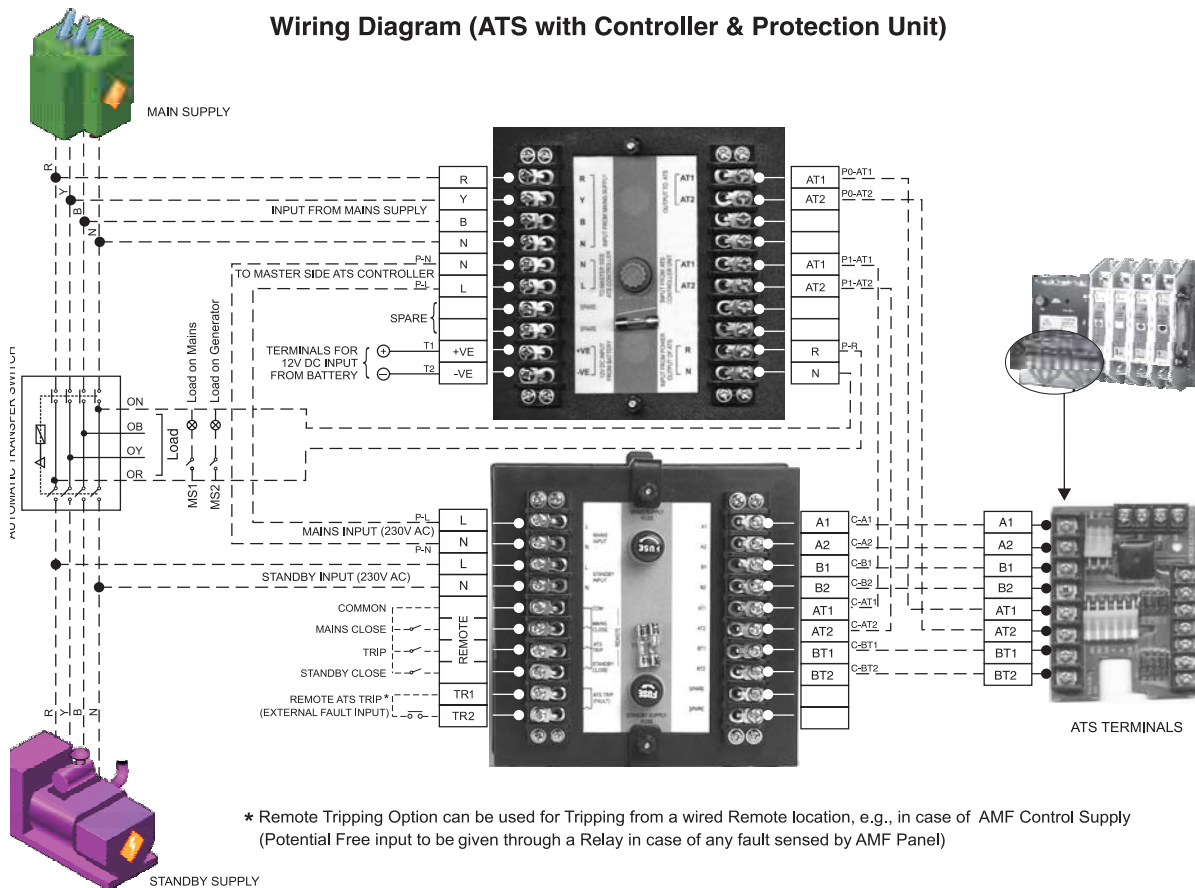
4 P - Four Pole

CIRCUIT DIAGRAMS

Wiring Diagram (Controller to ATS)



Wiring Diagram (ATS with Controller & Protection Unit)



Automatic Transfer Switch

UTILIZATION SCOPE

Auto Transfer Switch is a self-acting equipment containing the transfer switching devices and other necessary devices for monitoring supply circuits and for transferring one or more load circuits from one supply to another.

The operating sequence of ATS consists of an automatic transfer of a load from the normal supply to an alternate supply in the event of a monitored supply deviation and automatically returning the load to the normal supply when quality of mains supply is restored. The transfer is with a predetermined time delay and includes an interim off position.

In case of both the normal and the alternate supplies being present, the ATS shall assume the normal supply position, which is termed as 'preferred supply'.

The various utilization categories show the most popular applications of Auto Transfer Switch, as per IEC-60947-6-1.

UTILIZATION SCOPE

Nature of current	Utilization Category		Typical applications
	Frequent Operations	Infrequent operations	
Alternating Current	AC-31A	AC-31B	Non-inductive or slightly inductive loads Motor loads or mixed loads including motors, resistive loads and up to 30% incandescent lamp loads Electric discharge lamp loads Incandescent loads
	AC-33A	AC-33B	
	AC-35A	AC-35B	
	AC-36A	AC-36B	
Direct Current	DC-31A	DC-31B	Resistive loads Motor loads or mixed loads including motors Incandescent lamp load
	DC-33A	DC-33B	
	DC-36A	DC-36B	

THREE POLE - BASIC UNIT



Current Rating (A)	Cat. No.	Cat. No.
	STANDARD MODEL	WITH PRIMARY SIDE PROTECTION
OPEN EXECUTION		
100	ATA3OA0100SXXT	ATA3OD0100SXPT
160	ATA3OA0160SXXT	ATA3OD0160SXPT
200	ATA3OA0200SXXT	ATA3OD0200SXPT
315	ATA3OA0315SXXT	ATA3OD0315SXPT
400	ATA3OA0400SXXT	ATA3OD0400SXPT
630	ATA3OA0630SXXT	ATA3OD0630SXPT
IN ENCLOSURE		
100	ATA3EA0100SXXT	ATA3ED0100SXPT
160	ATA3EA0160SXXT	ATA3ED0160SXPT
200	ATA3EA0200SXXT	ATA3ED0200SXPT
315	ATA3EA0315SXXT	ATA3ED0315SXPT
400	ATA3EA0400SXXT	ATA3ED0400SXPT
630	ATA3EA0630SXXT	ATA3ED0630SXPT

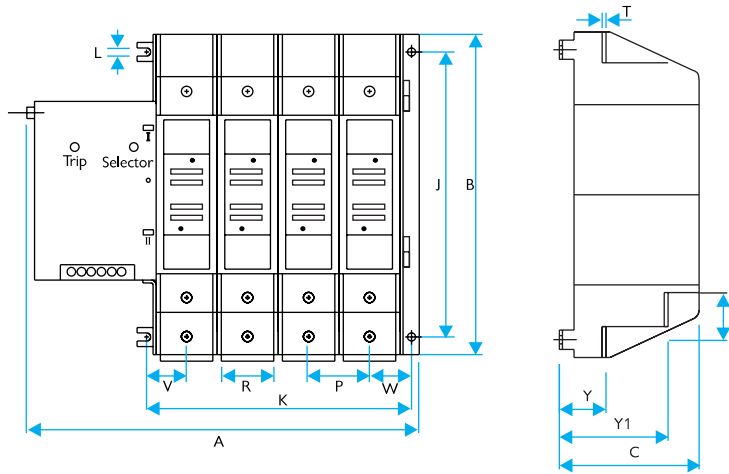
FOUR POLE - BASIC UNIT



Current Rating (A)	Cat. No.	Cat. No.
	STANDARD MODEL	WITH PRIMARY SIDE PROTECTION
OPEN EXECUTION		
100	ATA4OA0100SXXT	ATA4OD0100SXPT
160	ATA4OA0160SXXT	ATA4OD0160SXPT
200	ATA4OA0200SXXT	ATA4OD0200SXPT
315	ATA4OA0315SXXT	ATA4OD0315SXPT
400	ATA4OA0400SXXT	ATA4OD0400SXPT
630	ATA4OA0630SXXT	ATA4OD0630SXPT
IN ENCLOSURE		
100	ATA4EA0100SXXT	ATA4ED0100SXPT
160	ATA4EA0160SXXT	ATA4ED0160SXPT
200	ATA4EA0200SXXT	ATA4ED0200SXPT
315	ATA4EA0315SXXT	ATA4ED0315SXPT
400	ATA4EA0400SXXT	ATA4ED0400SXPT
630	ATA4EA0630SXXT	ATA4ED0630SXPT

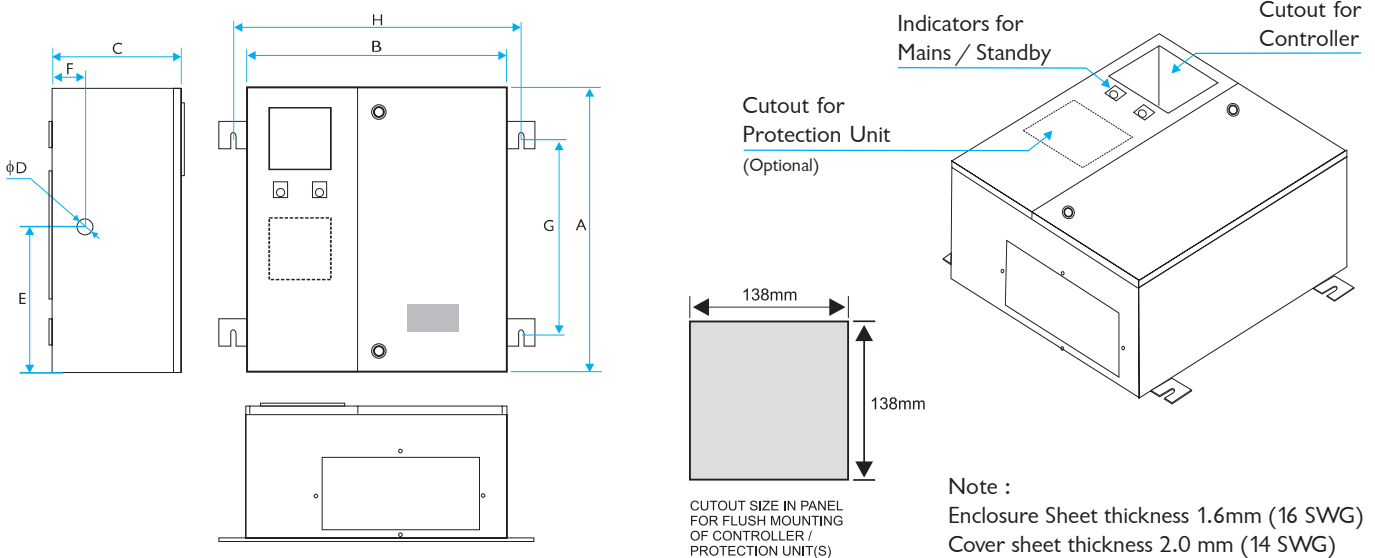
Note : Primary side protections include single phasing, over voltage, under voltage and phase reversal. While the trip coil operates using 220V AC available from either of the electrical sources, the protection unit requires 12 DC battery input for its functioning. The same needs to be made available from an uninterrupted source such as external battery being used for self start generator set.

DIMENSIONS (IN MM) - OPEN EXECUTION



Frame Size	Current Rating (A)	No. of Poles	Over All Dimensions			Switch Mounting			Connection Terminals						Terminal Bolt Size	Weight		
			A	B	C	J	K	L	P	R	S	T	V	W			Y	Y1
1	100	3P	257	241	122	201	132	φ9	38	15	30	4	29	29	40	90	M8x30MM	8.3Kg
	100	4P	295	241	122	201	170	φ9	38	15	30	4	29	29	40	90	M8x30MM	9.3Kg
1	160	3P	257	241	122	201	132	φ9	38	15	30	4	29	29	40	90	M8x30MM	8.7Kg
	160	4P	295	241	122	201	170	φ9	38	15	30	4	29	29	40	90	M8x30MM	9.7Kg
2	200	3P	290	253	122	213	167	φ9	48	30	30	5	34	34	40	90	M8x30MM	10.5Kg
	200	4P	338	253	122	213	216	φ9	48	30	30	5	34	34	40	90	M8x30MM	11.5Kg
2	315	3P	290	253	122	213	167	φ9	48	30	30	5	34	34	40	90	M8x30MM	11.0Kg
	315	4P	338	253	122	213	216	φ9	48	30	30	5	34	34	40	90	M8x30MM	12.0Kg
3	400	3P	340	337	144	290	218	φ10	60	40	40	5	42	34	38	110	M10x40MM	19.5Kg
	400	4P	400	337	144	290	278	φ10	60	40	40	5	42	34	38	110	M10x40MM	21.0Kg
3	630	3P	340	337	144	290	218	φ10	60	44	40	7	42	34	38	110	M10x40MM	21.0Kg
	630	4P	400	337	144	290	278	φ10	60	44	40	7	42	34	38	110	M10x40MM	22.5Kg

DIMENSIONS (IN MM) - IN ENCLOSURE



Rating	A	B	C	D	E	F	G	H
100A-315A	550	450	240	φ 25.4	322	60	503	510
400A-630A	550	520	236	φ 25.4	332	65	503	580