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).

Features:

- High speed transfer
- Superior making & breaking capacity
- Compact & light weight design
- Positive indication through flag indicator
- Neutral point transfer
- Liberal terminals
- Phase barriers Range
- Release operates in 2 modes - automatic and manual

Range :

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

Specification :

Conforms to IS/IEC:60947-6-1

Automatic Transfer Switch

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.

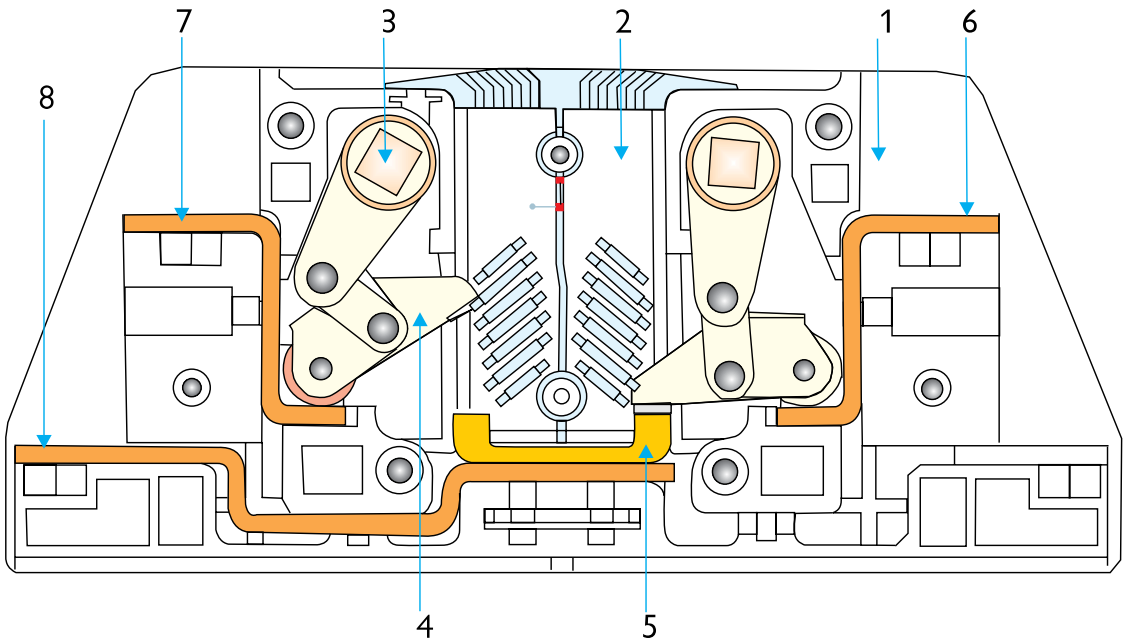
Main Operating Mechanism

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 220 Vac. The operating mechanism always responds by closing on the main supply side and not on to standby supply side, when both supplies are present.

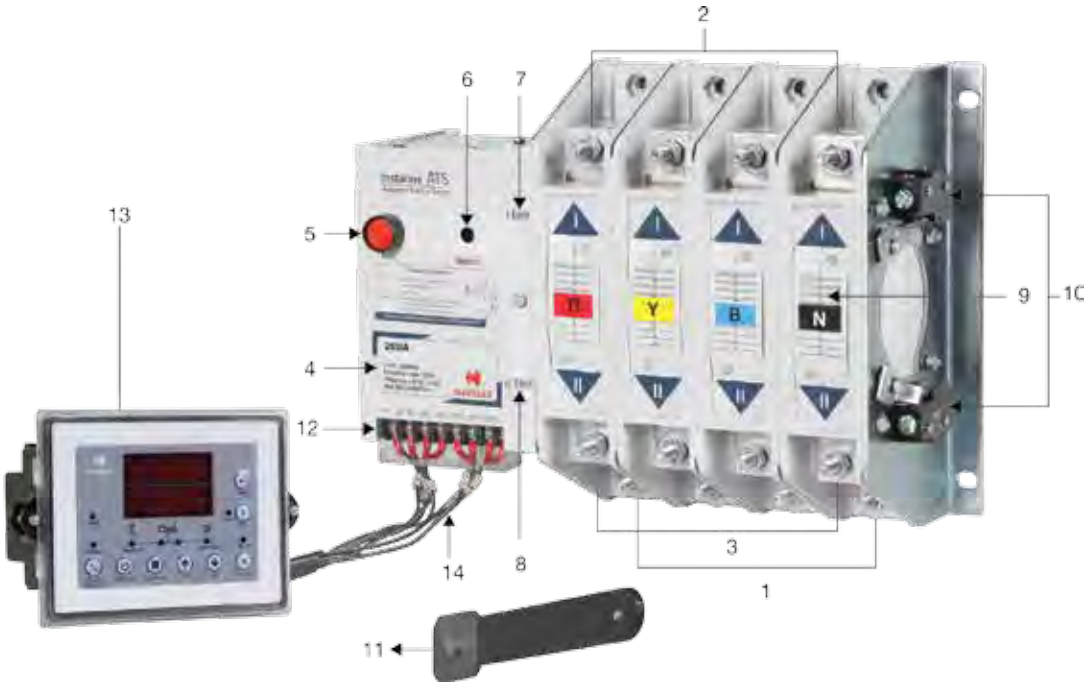
The tripping coil, when energised, is used to bring the ATS to OFF / Neutral position.
Closing on to the standby supply is achieved through the selective coil. The energisation of selective coil, disengages the main mechanism and prevents closing on to the main supply. The solenoid coil can then close 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

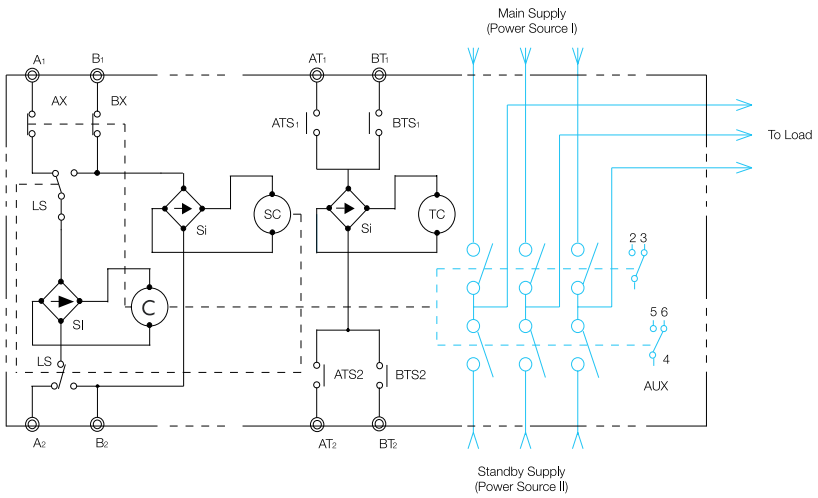
External view with identification of parts



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

Operation

I - Automatic



In the event of main supply being available, the ATS can be instantaneously switched ON, by the closing coil C, through terminals A1, A2, 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 BT1 - BT2. 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 swtiches LS and terminals B_1, B_2.

The Trip Coil TC, can be energised through AT_1 - AT_2 or BT1 - BT_2 to switch off the main supply or standby supply.

II - Manual

Click to lock

Keep selector pressed using a screwdriver

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 45^0 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 continously pressed and the manual handle rotates the operating shaft by about 45^0 in anticlockwise direction.

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

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 though an angle (approximately 45°)

Closing ATS manually to source-I

Switch to source-I (mains) by rotating the handle upwards though an angle (approximately 45°)

Technical Information

Frame Size		SI Unit	TNFO1			TNFO2	
Rated Operational Current I_e		A	100	125	160	200	250
Conventional free air thermal current I_{th}		A	100	125	160	200	250
Rated Operational Current I_{the}		A	100	125	160	200	250
Rated uninterrupted Current I_u		A	100	125	160	200	250
No. of Poles			3P / 4P	3P / 4P	3P / 4P	3P / 4P	3P / 4P
Rated Insulation Voltage U_i		V	1000	1000	1000	1000	1000
Rated Operational Voltage U_e		V	415 Vac / 110 Vdc			415 Vac / 110 Vdc	
Rated frequency		Hz	50	50	50	50	50
Class			PC	PC	PC	PC	PC
Utilization Category			AC 31 A	AC 31 A	AC 31 A	AC 31 A	AC 31 A
Di-electric Strength		kV	5	5	5	5	5
Rated Impulse withstand Voltage U_{imp}		kV	8	8	8	8	8
Rated making capacity at 415 V (Cosø = 0.80)		A	150	187.5	240	300	375
Rated breaking capacity at 415 V (Cosø = 0.80)		A	150	187.5	240	300	375
Rated short time withstand current (1 sec)		kA rms	5	6	7	10	11
Rated Conditional short circuit current		kA rms	80	80	80	80	80
Rated Short circuit making capacity		kA rms	7.65	14	17	17	17
Mech. Life (No. of ops.)			10,000	10,000	10,000	10,000	10,000
Elect. Life (No. of ops.)			6,000	6,000	6,000	6,000	6,000
Switching frequency (ops. per Hr)			60	60	60	60	60
Terminal Position			Front	Front	Front	Front	Front
Terminal Capacity - Cu (cable)		mm^2	35	50	70	95	150
Al (cable)		mm^2	50	70	95	150	185
Busbar		mm	---	---	---	---	---
Weight 3P kg			8.3	8.3	8.7	10.5	10.5
4P kg			9.3	9.3	9.7	11.5	11.5
Mounting			Vertical	Vertical	Vertical	Vertical	Vertical
Coil							
Operating Voltage		V	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	3.0 /3.5	4.0/4.5	4.0/4.5
Trip Coil			0.5	0.5	0.5	0.5	0.5
Operating Time		(ms)					
Main Power Source	Make		55	55	55	55	55
	Break		20	20	20	20	20
Standby Power Source	Make		80	80	80	80	80
	Break		20	20	20	20	20
Changeover time			(Using Controller Mode)				
Changeover time					min	-	0.1 sec
					max	-	60 sec

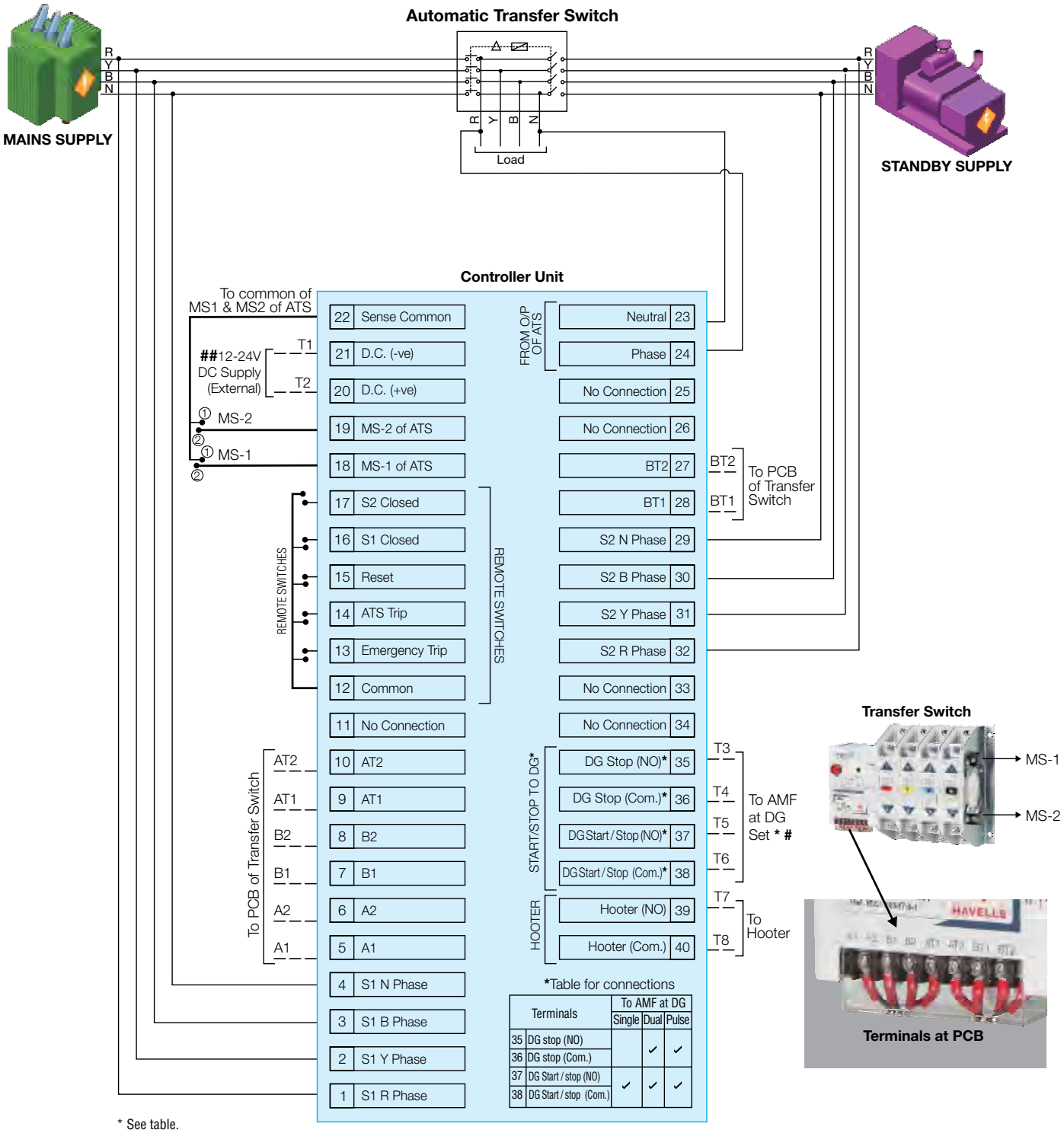
3 P - Three Pole, 4 P - Four Pole

Technical Information

Frame Size	SI Unit	TNFO3		TNFO4	
Rated Operational Current Ie	A	315	400	500	630
Conventional free air thermal current I_{th}	A	315	400	500	630
Rated Operational Current I_{the}	A	315	400	500	630
Rated uninterrupted Current I_u	A	315	400	500	630
No. of Poles		3P/4P	3P / 4P	3P / 4P	3P / 4P
Rated Insulation Voltage Ui	V	1000	1000	1000	1000
Rated Operational Voltage Ue	V	415 Vac / 110 Vdc	415 Vac / 110 Vdc	415 Vac / 110 Vdc	
Rated frequency	Hz	50	50	50	50
Class		PC	PC	PC	PC
Utilization Category		AC31 A	AC 31 A	AC 31 A	AC31 A
Dielectric Strength	kV	5	5	5	5
Rated Impulse withstand Voltage Uimp	kV	8	8	8	8
Rated making capacity at 415 V (Cosø = 0.80)	A	473	600	750	945
Rated breaking capacity at 415 V (Cosø = 0.80)	A	473	600	750	945
Rated Conditional short circuit current	kA rms	12	12	12	15
Fuse protected S/C withstand current	kA rms	80	80	80	80
Rated Short circuit making capacity	kA rms	17	17	17	25.2
Mech. Life (No. of ops.)		10,000	10,000	10,000	10,000
Elect. Life (No. of ops.)		4,000	4,000	4,000	2,000
Switching frequency (ops. per Hr)		60	60	60	60
Terminal Position		Front	Front	Front	Front
Terminal Capacity - Cu (cable)	mm^2	185	240	---	---
Al (cable)	mm^2	240	300	---	---
Busbar	mm	---	40 x 5 x 2	40 x 6 x 2	40 x 8 x 2
Weight 3P kg		11	18	18	19.5
4P kg		12	21	21	22.5
Mounting		Vertical	Vertical	Vertical	Vertical
Coil					
Operating Voltage	V	200 / 220	200 / 220	200 / 220	200 / 220
Operating Current	A				
Main Coil 3P / 4P		4.0/4.5	8.0/10.5	8.0/10.5	8.0/10.5
Trip Coil		0.5	0.7	0.7	0.7
Operating Time	(ms)				
Main Power Source Make		55	60	60	60
Break		20	25	25	25
Standby Power Source Make		80	90	90	90
Break		20	25	25	25
Changeover time		0.1 sec			
Changeover time		60 sec			

3 P - Three Pole
4 P - Four Pole

Circuit Wiring Diagram



* See table.
# Not required in Changeover (C) mode.
##Not required in Changeover (C) mode for operation.

ATS Controller

Introduction

- Havells ATS controller can be programmed for both ATS and Changeover (C) configurations.
- Both these configurations can be further operated in both Auto and Manual modes.
- Communication (Start / Stop) feature with DG for automatic starting and stopping of DG.
- In the Changeover mode, no external 12 Vdc supply is required for its operation.
- 3 types of provision for DG start/ stop command- Single Contact, Dual Contact or Pulse Contact.
- Capable of measuring 1 Phase / 3 Phase Voltage of both mains & DG, along with the mains frequency.
- Inbuilt protection for mains against Under/Over Voltage, Under/Over Frequency and the phase failure.
- Suitable for both Utility-DG and Utility-Utility applications
- Eight LED annunciations on its front panel to indicate the Source & Contacts Status.
- Records the last 50 events with date and time stamping
- 6 Digit, 2 Row, Alpha Numeric LCD Display with 7 segments for ease of readout.
- True RMS measurement of all measured parameters.
- Display of parameters in the auto scrolling mode which can be enable and disabled.
- Plug in connectors for prompt and error free replacement.

ATS Configuration:

ATS controller monitors the Mains (S1) supply, if Mains (S1) supply varies beyond set limit of under/over voltage or under/over frequency for more than their individual programmed supervision time, ATS releases the Mains (S1) contacts, trips and the potential free contact(s)* becomes NC to send a command to the AMF controller at DG Set (Source 2) to start it. On restoration of healthy Mains (S1) supply continuously for the programmed duration, the ATS releases the DG Set (Source 2) contacts, trips and the potential free contact(s)* becomes NO which in itself acts as a command to the AMF controller at DG Set (Source 2) to stop it. The load is transferred to the mains (S1) and the generator is stopped after the programmed re-cooling time delay.

Changeover Configuration:

This is similar to ATS configuration only except that the communication (Start/Stop) with the DG Set (Source2) is disabled. Also, in this mode, no external 12-24 Vdc. supply is required for its operation. The controller monitors the Mains supply, if Mains (S1) supply varies beyond set limit of under/over voltage or under/over frequency for more than their individual programmed supervision time, the ATS releases the Mains (S1) contacts and trips. In case, the source 2 becomes available in healthy condition, it shifts the contacts to DG (Source 2), otherwise it rests in TRIP position only. On restoration of healthy Mains (S1) supply continuously for the programmed duration, the ATS releases the source 2 contacts, trips and shifts the contacts to source1 to transfer the load to the Mains (S1) supply. In this configuration, in case if both the Mains (S1) and DG (S2) supplies are unavailable / unhealthy, then only to turn ON the display, the external 12-24 Vac supply is required.

*Potential Free Contacts for DG Start/Stop:

There are three types of potential free contacts for DG Start/Stop:

i) **Single Contact:** Single potential free contact (at 37-38) is used for both Start & Stop. This potential free contact becomes NC to send a command to the AMF controller at DG Set (Source 2) to start it. And to give the Stop command, these contacts become NO and the same is the position by default also.

ii) **Dual Contact:** Two separate potential free contacts are used, one each for Start & Stop to the AMF controller at DG Set (Source 2). To give the Start command, the potential free contact at 37-38 becomes NC and the other at 35-36 remains at NO position. Similarly, to give the Stop command the potential free contact at 35-36 becomes NC while the other at 37-38 becomes NO and the same is the position by default also.

iii) **Pulse Contact:** This is similar to Dual contact (ii) only, except that the Start/Stop commands are given for a pulse duration (1 second) to the AMF controller at DG Set (Source 2). By default, both the potential free contacts remain at NO position. To give the Start command, the potential free contact at 37-38 becomes NC for a pulse duration of 1 second and then comes back to the NO position. Similarly, to give the Stop command, the potential free contact at 35-36 becomes NC for a pulse duration of 1 second and then comes back to the NO position.

Display / Front Panel

- 6 Digit, 2 Row, Alpha Numeric, 7 segment display for ease of readout. Parameters are displayed in English. Normally the display auto scrolls and displays a parameter for 10 seconds, but any time the Next key (✓) can be pressed to select the next parameter window.

Measurements, Protection and Supervision

Measurements

- 1 Phase/ 3 Phase Voltage of mains
- Mains Frequency
- 1 Phase/ 3 Phase Voltage of DG

Protection / Supervision Mains

- Under/Over Voltage
- Under/Over Frequency
- Phase Fail

View Event Recording

Last 50 events can be viewed with date and time stamping

Faults

- Trip Fail
- S1 Close Fail
- S2 Close Fail
- Emergency Trip (ATS)
- Fail To Start (DG/ Source 2)
- Fail To Stop (DG/ Source 2)

Input and Output

Potential Free Output:

ATS controller has 3 potential free output as below:

- Hooter (Com.)
- DG Start/Stop (Com.)
- DG Stop (Com.)
- Hooter (NO)
- DG Start / Stop (NO)
- DG Stop (NO)

Digital Input:

ATS controller has 6 digital input as below

- MS-1 of ATS
- MS-2 of ATS
- Reset
- Emergency Trip
- S1 Closed
- S2 Closed
- ATS Trip

Output:

ATS Controller has 8 outputs :

- A1
- A2
- B1
- B2
- AT1
- AT2
- BT1
- BT2

Specifications

AC voltage withstand	330 Vac (Phase to neutral)
Surge 1.2/50Usec	2.5 kV
Control Supply	Suitable for 12 Vac - 24 Vac (External) Supply
Cut out Dimensions	154 mm X 116 mm
Depth	72 mm

LED Annunciations Description:

ATS Controller has eight annunciations on its front panel. These either announce the faults or indicate the supply & contacts' status of the system.

Nomenclature	Description
Auto	Led lights up when ATS controller is in Auto mode
Manual	Led lights up when ATS Controller is in Manual mode
Trip	Led light up when ATS is in tripped position
Source 1	LED lights up continuously if Mains is healthy and starts blinking in case Mains is absent or unhealthy
Source 1 Contacts	LED lights up in case the load is connected to Mains (Source 1)
Source 2 Contacts	LED lights up in case load is connected to DG (Source 2)
Source 2	LED lights up continuously if Generator supply is healthy and starts blinking in case Generator supply is unhealthy. By default, this LED remains OFF in case DG (S2) is in turned OFF (or Stop) state.
Fault	This LED blinks in case of fault

Switches Description

ATS Controller has 8 switches provided on its front panel. The table below describes the operation of these.

Switch Symbols	Switch Function	Description
	Next	Normal operation mode: In this mode, it is used to change the measured system parameters being displayed on the LCD. Edit Parameter Mode: Next key is used to select or go to the next parameter to be edited.
	DG Start	It is used to send the start command to DG (S 2) in Manual mode.
	DG Stop	It is used to send the stop command to DG (S 2) in Manual mode.
R	Reset	It resets the signals of Hooter, Faults, Emergency trip etc. The first press shall reset the hooter and next shall reset the faults. A long press of 1 Sec shall reset the both.
R	Edit Parameter	If both these keys are pressed simultaneously, then the unit enters Edit Parameter Mode
	S 1	In Edit Parameter mode, it increment the values. In Normal Operation (Manual Mode), it is used to transit load from TRIP to Mains (S 1).
	S 2	In Edit Parameter mode, it decrement the values. In Normal Operation (Manual Mode), it is used to transit load from TRIP to DG Set (S 2).
A/M	Auto / Manual	It is used to enter the Auto or Manual modes alternatively (on pressing).
T	Trip	It is used to trip the ATS (either from Mains (S 1) or DG Set (S 2)).

Setting Procedure:

Press Next & Reset switches simultaneously. The LCD shall display, "Edit"

To enter edit Parameter setting mode press Next Switch For any change in value in edit parameter press S1 switch and S2 switch.

Edit:

Parameter Name on LCD & Icon	Explanation of Parameter	Factory Setting	Setting Range
SYS Ph	It is possible to select ATS and changeover configurations for any combination of Mains phases (1/3) and DG phases (1/3), where "C" indicates the changeover configuration. e.g. the factory setting " C 3M 3G" indicates to operate the ATS in changeover configuration and both Mains and DG are 3-phase systems.	C 3M 3G	C 1M 1G C 3M 1G C 3M 3G 1M 1G 3M 1G 3M 3G
S1 OV	Max. Permissible Mains voltage, above this the Mains voltage is treated unhealthy or over voltage condition.	270 V	080-300 V
S1 UV	Min. permissible voltage, below this the voltage is treated unhealthy or under voltage condition.	180 V	80-300 V
VD	Duration for which Mains Over / Under voltage condition is to be tolerated before tripping the ATS.	10	1-999 Sec.
OF	Max. permissible Mains frequency, above this frequency the Main is treated unhealthy or over frequency condition.	55.0 Hz	40.0-65.0 Hz
UF	Min. permissible Mains frequency, below this frequency the Mains is treated unhealthy or under frequency condition.	45.0 Hz	40.0-65.0 Hz
S1 Fd	Time for which the unhealthy Mains frequency is to be tolerated (under or over frequency as defined above) before tripping the ATS.	10	1-999 Sec.
S2 PV	This parameter specifies the generator voltage at which it is considered to be in healthy condition.	200 V	80-270 V
S1 FL	Some application require to trip the ATS on failure of one of the phases. Others want all the 3 phases to become unhealthy before tripping the ATS. The ATS Controller can handle both situations.	1P FAIL	1P FAIL 3P FAIL
StRT T	The time, for which the Controller will give starting command to the Generator*	150 Second	0-999 Second
S2 WT	DG (S2) warm up time after DG build up voltage has crossed the set limit (S2 PV).	0 Second	0-999 Second
S1 S2 d	User programmable delay when the load is transferred from Generator to Mains.	2.0 Second	0-99.9 Second
S1 RT	The time for which Mains should be continuously healthy before the load is transferred from DG (S2) to Mains (S1).	10 Second	1-999 Second
RCOL	The time for which after transfering load to Mains from DG (S2), the DG is allowed to run at no load for cooling. After this time the stop command is sent to the DG (S2).	10 Second	1-999 Second
C Ty	The type of potential free contacts which goes to the AMF at DG to give the start / stop command (Refer page 10 for potential free contacts).	S CO	P CO (Pulse) d CO (Dual) S CO (Single)
StOP T	The time for which the controller gives the stopping command to DG (S2).	20 Second	0-999 Second
HOOTER	Duration for which the hooter shall be ON (if not externally reset), while announcing a fault or emergency trip.	30 Second	0-999 Second
AUTO S	Setting ON will enable Auto Scroll of display. Disabling this will not scroll and the next parameters can be viewed by pressing next switch.	ON	ON / OFF

*Not required in Changeover (C) mode.

View Event:

Press Next and Reset Switches simultaneously. The LCD shall display "Edit".

To go to next menu after the "Edit" press S1 Switch, the LCD shall display **"View Event"**. To View Display Event mode press Next Switch. ATS keeps a log of last 50 events. Parameter change, RTC Change, Mode Change and Fault are considered as event. Events are stamped along with date and time and to view them, keep on pressing Next Switch. To come out of this **"View Event"** mode, press the Reset switch.

RTC Set:

After the "View Event" is displayed press S1 Switch, the LCD shall display **"RTC set"**. To change the RTC (real time clock) press Next Switch. Firstly, the YEAR shall be displayed. For feeding value, use the S1 & S2 switches. Then pressing the Next switch, MON (Month) will be displayed. Similarly, then date, then SEC (seconds), MIN (minutes) and HOUR (hours) can be edited.

ATS / Changeover Configuration

ATS Configuration

Auto Mode

ATS controller monitors the Mains (S1) supply, if Mains (S1) supply varies beyond set limit of under/over voltage or under/over frequency for more than their individual programmed supervision time (S1 VD/FD), the ATS releases the Mains (S1) contacts, trips and sends a start command to the DG (S2). After successful start of the Dg (S2), the controller checks for the build-up voltage. If it crosses the limit “S2 PV” then it is considered that the DG supply is healthy. After this, it is allowed to warm up for a user programmed time before the load is transferred to generator.

If generator fails to start within the set ‘’STRT T” time, the fault LED lights up along with the message on the display, indicating the start failure and the hooter is switched on. Also, in case if the DG (S2) voltage drops below the programmed “S2 PV” limit, the ATS trips & the fault LED lights up along with the message on the display (S2 VOL) and the hooter is switched on.

On restoration of healthy mains supply, continuously for the programmed duration (S1 RT), the ATS trips, the load is transferred to the mains and the controller allows the DG to run on no load for the programmed duration (R COL) for cooling. After this, the controller sends a STOP command to the DG (S2) to stop it.

In case, if the DG (S2) fails to stop within the set ‘STOP T’ time, the fault LED starts blinking along with the message on the display, indicating the stop failure and hotter is switched ON. To reset the Start / Stop fault, firstly the fault needs to be cleared by making the generator OFF.

Manual Mode

In this mode, the engine has to be started by manually pressing “DG Start” switch. The “DG Start” switch shall not operate if DG (S2) contact is already closed. Once the DG (S2) is started, the load can be switched to DG (S2) side by pressing “S2” switch. At any given time, any one either Mains (S1) or DG (S2) can be made operational. Attempt of pressing switch “S2” while load is connected to Mains (S1) and vice-versa will be denied. The controller will show a warning message to Trip the ATS first. For tripping, press the “Trip” switch.

To stop the DG (S2), first trip the ATS by pressing “Trip” switch and press “DG Stop” switch. By this, after the delay as per programmed “R COL” time, the controller will send the stop command to the DG (S2). Any attempt to stop the DG (S2), while the DG (S2) contact of ATS is engaged, shall be denied.

During the remote operation, the function of all the switches- “S1”, “S2”, “Reset” & “Trip” will remain the same as it was with the switches on the front fascia of the controller unit. Along with this we have “Emergency Trip” command in remote operation which will immediately trip the ATS as required in case of emergency. This emergency tripping will be unlike normal tripping which will light up fault LED and hooter will get ON.

Changeover (C) Configuration

Auto Mode

This is similar to ATS configuration only except that the communication (Start/Stop) with the DG (S2) is disabled. Also, in this mode, no external 12-24 Vdc. supply is required for its operation. It autmatically takes the power (control supply) from Mains (S1) or DG (S2) which ever is available for its operation. The controller monitors both the supplies, the Source 1 & Source 2, and shift the contacts towards that supply whichever is available in healthy condition continuously for the user programmed duration keeping the Source 1 on priority.

If Source 1 supply varies beyond set limit of under/over voltage or under/over frequency for more than their individual programmed supervision time (S1 VD/FD), the ATS releases the Source 1 contacts and trips. In case the source 2 becomes available in healthy condition, it shifts the contacts towards Source 2. Otherwise, it rests in TRIP position only.

In case if the load is connected to Source 2, then on restoration of healthy mains supply continuously for the programmed duration (S1 RT), the ATS releases the Source 2 contacts, trips and shifts the contacts to Source 1 to transfer the load to the Source 1 side. During the transition from TRIP to any of the supplies, if that supply again becomes unhealthy then the fault LED will start blinking indicating the contact failure on that source (S1/S2 CNT Fault) and the hooter is switched ON.

In case both the supplies are unavailable / absent the controller brings the ATS to the trip position. At this time the controller gets switched OFF and it turns ON automatically as soon as anyone of the S1 or S2 becomes available in healthy condition.

Manual Mode

In this mode, the load can be shifted from one source to another by first pressing the Trip button followed by pressing of that source button (S1 or S2) to which the load is to be shifted. At any given time, either of Source 1 or Source 2 can be made operational. Any attempt to switch on S2 while S1 is ON and vice-versa will be denied with a warning message as “TRIP FIRST” on display. In this Changeover manual mode, unlike ATS manual mode it doesn’t require to give the start or stop commands before shifting the load to S1 or S2 respectively.

The remote operation is same as in the manual operation of ATS mode.

Note: In ATS configuration, the Controller unit requires 12 to 24 volts DC source 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 etc.

In Changeover (C) configuration, in case if both the Mains (S1) and DG (S2) supplies are unavailable / unhealthy, then only to turn ON the display, the external 12-24 Vac supply is requried and not for operation.

Terminal Numbers

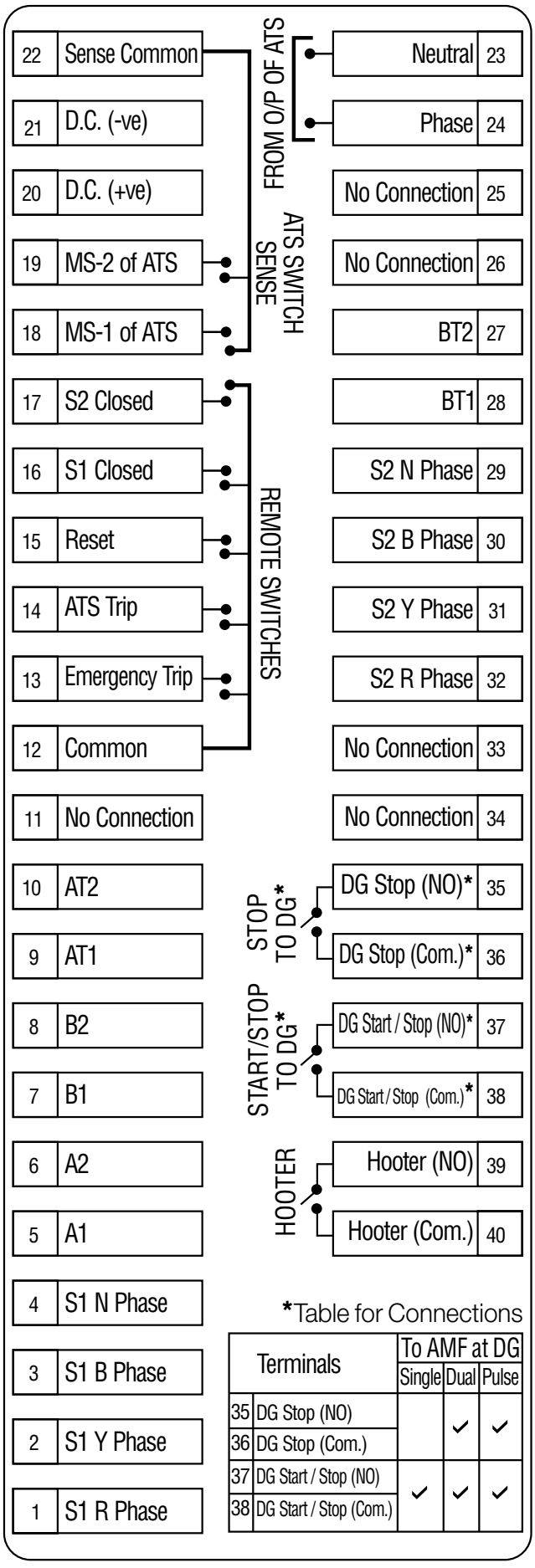


*Table for Connections

Terminals		To AMF at DG		
		Single	Dual	Pulse
35	DG Stop (NO)		✓	✓
36	DG Stop (Com.)			
37	DG Start / Stop (NO)	✓	✓	✓
38	DG Start / Stop (Com.)			

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.

Nature of current	Utilization Category		Typical applications
	Operations A	Operations B	
Alternating Current	AC-31A	AC-31B	Non-inductive or slightly inductive loads
	AC-32 A	AC-32B	Switching of mixed resistive and inductive loads, including moderate overloads
	AC-33 A	AC-33B	Motor loads or mixed loads including motors, resistive loads and up to 30% incandescent lamp loads
	AC-35 A	AC-35B	Electric discharge lamp loads
	AC-36 A	AC-36B	Incandescent loads
Direct Current	DC-31 A	DC-31B	Resistive loads
	DC-33 A	DC-33B	Motor loads or mixed loads including motors
	DC-36 A	DC-36B	Incandescent lamp load

Ordering Information
ATS unit with Controller

Current Rating (A)	Cat. No. 3 Pole	Cat. No. 4 Pole
Open Execution		
100	IHYTCDO100	IHYFCDO100
125	IHYTCDO125	IHYFCDO125
160	IHYTCDO160	IHYFCDO160
200	IHYTCDO200	IHYFCDO200
250	IHYTCDO250	IHYFCDO250
315	IHYTCDO315	IHYFCDO315
400	IHYTCDO400	IHYFCDO400
500	IHYTCDO500	IHYFCDO500
630	IHYTCDO630	IHYFCDO630
In Enclosure		
100	IHYTCDE100	IHYFCDE100
125	IHYTCDE125	IHYFCDE125
160	IHYTCDE160	IHYFCDE160
200	IHYTCDE200	IHYFCDE200
250	IHYTCDE250	IHYFCDE250
315	IHYTCDE315	IHYFCDE315
400	IHYTCDE400	IHYFCDE400
500	IHYTCDE500	IHYFCDE500
630	IHYTCDE630	IHYFCDE630

Automatic Transfer Switch without Controller

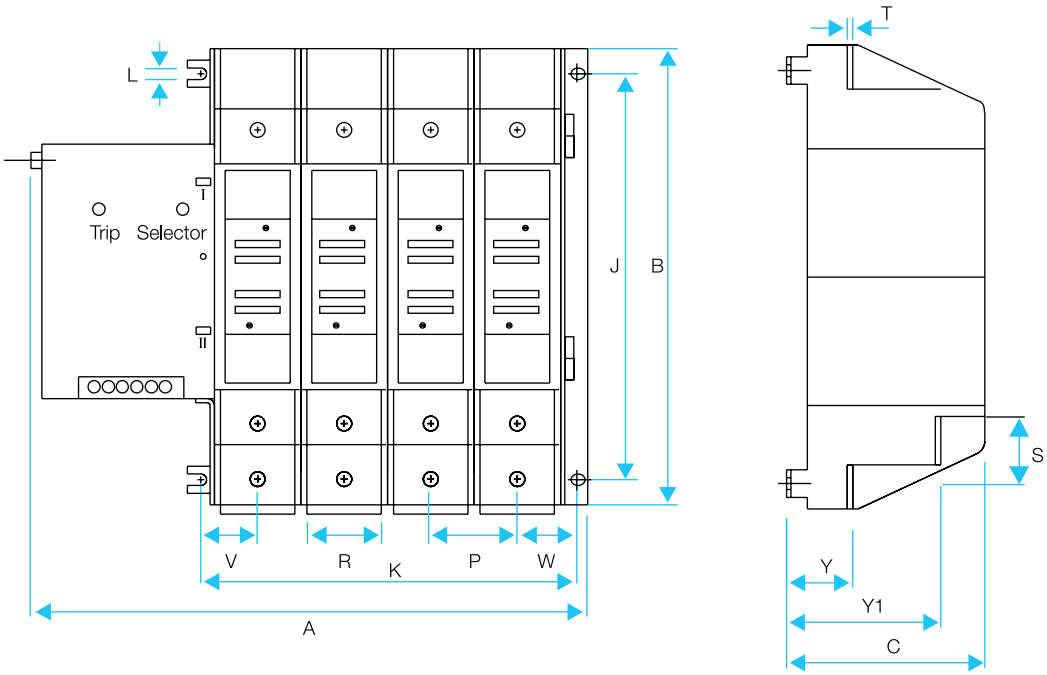
Rating (A)	Cat. No.
Open Execution	
100	IHYFNAO100
125	IHYFNAO125
160	IHYFNAO160
200	IHYFNAO200
250	IHYFNAO250
315	IHYFNAO315
400	IHYFNAO400
500	IHYFNAO500
630	IHYFNAO630

Note:
In Changeover (C) configuration, no external 12-24 Vac supply is required its operation.

In ATS configuration, the Controller unit requires 12 to 24 volts DC source 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 etc.

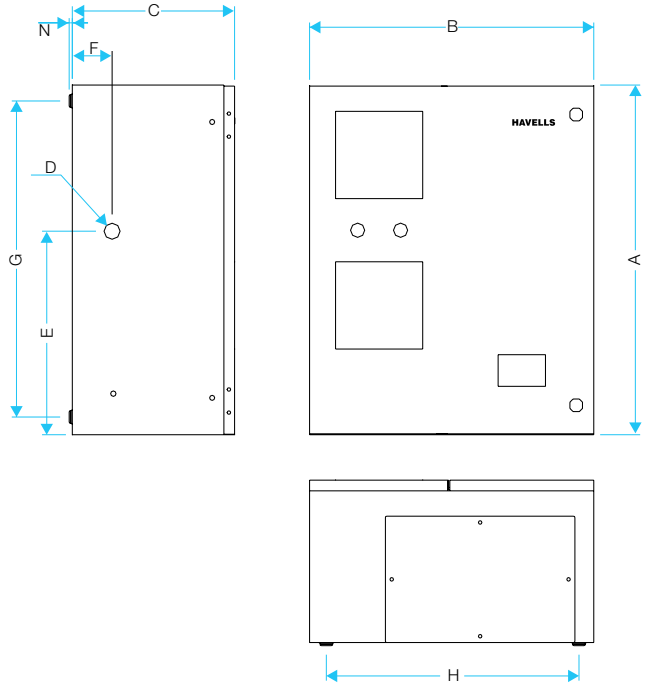
I- Open Execution

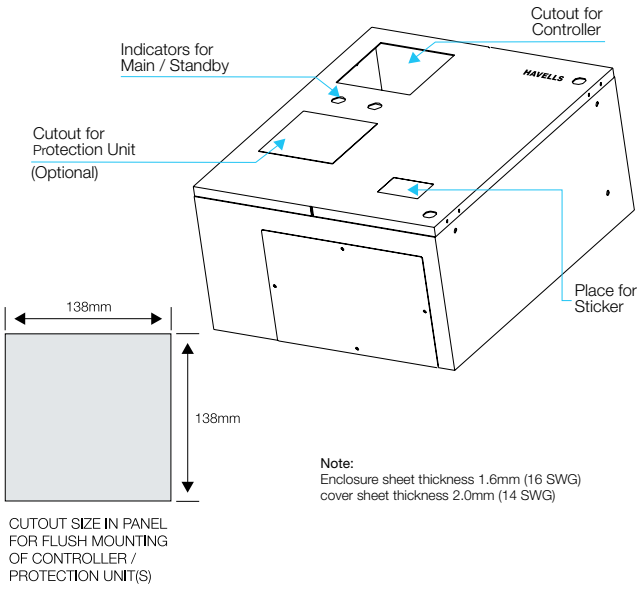
Dimensions (in mm)



Frame Size	Current rating (A)	No. of Poles	Over all dimensions			Switch mounting			Connection Terminals								Terminal Bolt Size (mm)	Weight (kg)
			A	B	C	J	K	L	P	R	S	T	V	W	Y	Y 1		
1	100-160	3P	257	241	122	201	139	Φ9	38	15	30	4	30	32	40	90	M8X25	8.3 (100 A,125 A), 8.7 (160 A)
		4P	295	241	122	201	177	Φ9	38	15	30	4	30	32	40	90	M8X25	9.3 (100 A,125 A), 9.7 (160 A)
2	200-250	3P	290	253	122	213	172	Φ9	49	30	30	4.5	35	38	40	90	M8X30	10.5 (200 A), 11 (250 A)
		4P	338	253	122	213	221	Φ9	49	30	30	4.5	35	38	40	90	M8X30	11.5 (200 A), 12 (250 A)
3	315-400	3P	311	253	122	213	193	Φ10	56	40	28	5	46	52	38	110	M10X25	13.1 (315 A), 13.5 (400 A)
		4P	367	253	122	213	249	Φ10	56	40	28	5	46	52	38	110	M10X25	14.1 (315 A), 14.5 (400 A)
4	500-630	3P	340	337	144	290	208	Φ10	60	44	40	7	42	42	38	110	M10X40	20.6 (500 A), 21 (630 A)
		4P	400	337	144	290	270	Φ10	60	44	40	7	42	42	38	110	M10X40	20.6 (500 A), 22.5 (630 A)

II- In Enclosure





CUTOUT SIZE IN PANEL
FOR FLUSH MOUNTING
OF CONTROLLER /
PROTECTION UNIT(S)

Note:
Enclosure sheet thickness 1.6mm (16 SWG)
cover sheet thickness 2.0mm (14 SWG)

Rating	A	B	C	D	E	F	G	H	N
100 A-250 A	550	450	255	ϕ 25.4	320	63	500	400	5
315 A-630 A	550	520	275	ϕ 25.4	328	68	500	470	5