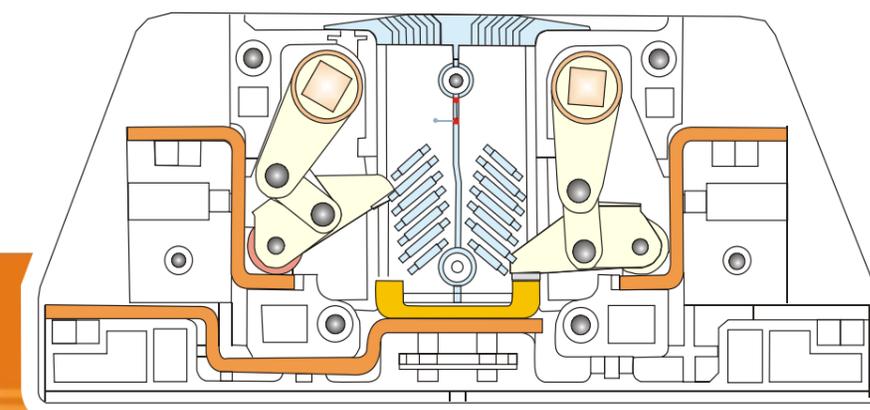


INSTALINE

Automatic Transfer Switch



Instruction Manual

Automatic Transfer Switch



HAVELL'S SWITCHGEAR

Havell's India Limited
Corporate Office

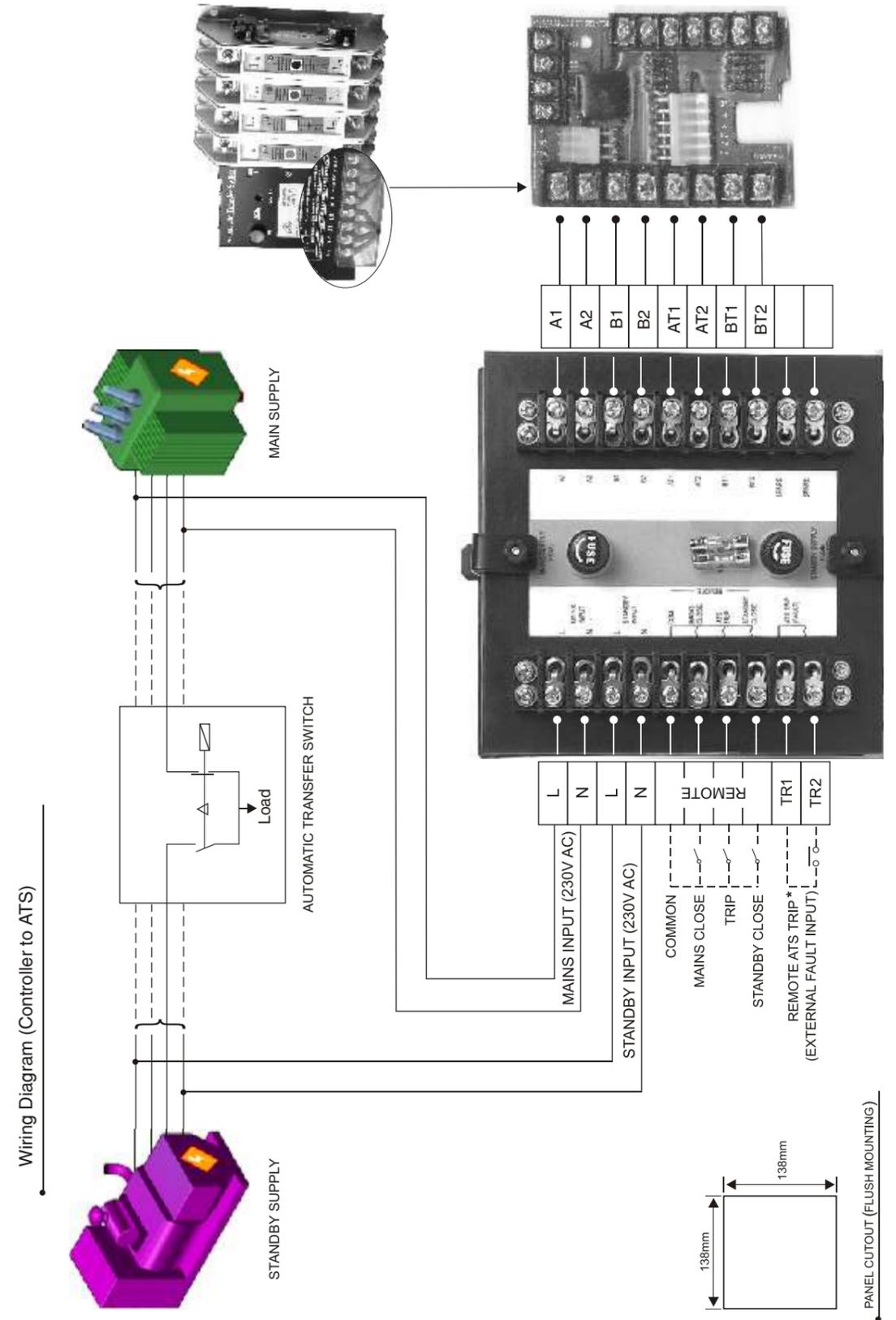
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Contents

External View with identification of parts	1
Instructions for storage and handling	1
Installation / mounting	2
Identification of spares / subassemblies	3
Ordering information for spares	3
Aluminum/Copper Cable/Bus Bar Sizes for external terminations	4
Functioning of the ATS Unit	
Internal coil wiring Diagram	4
Operating ATS in manual Mode	5
Troubleshooting	5
Wiring Diagram (Controller to ATS)	9



* Remote Tripping Option can be used for Tripping from a wired Remote location, e.g., in case of AMF Control Supply (Potential Free input to be given through a Relay in case of any fault sensed by AMF Panel)

Fault: ATS is not closing towards source-II whereas it is closing properly towards source-I:

When an input of 230V AC is given across terminals B1 & B2 and the ATS does not close towards source-II, the following checks need to be made (with 230V AC applied across B1 & B2):

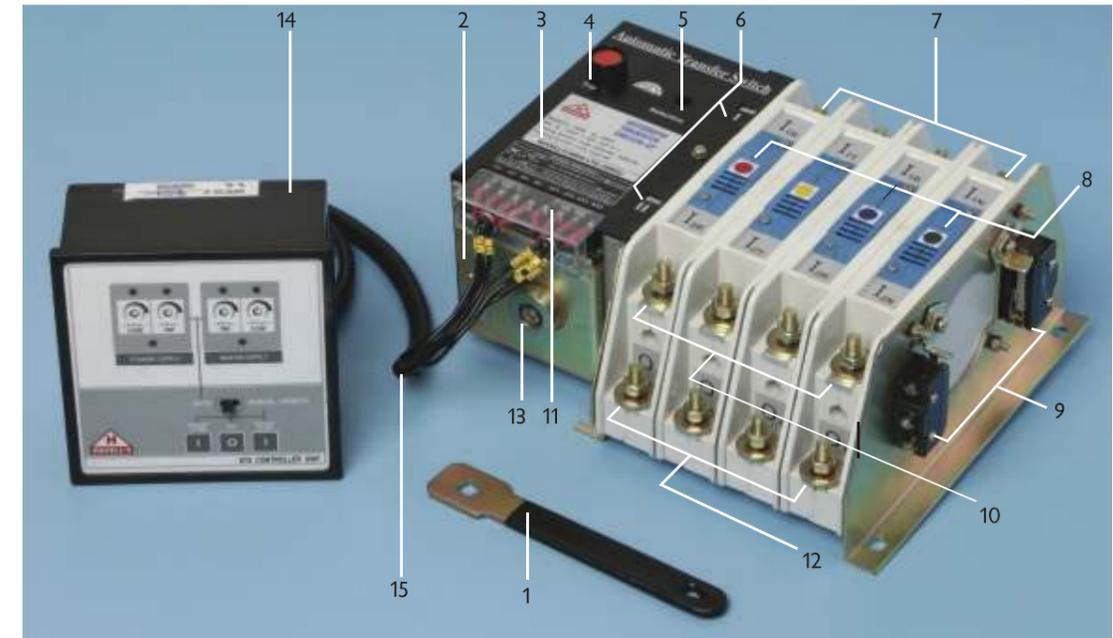
- a. In case of closure towards source-II, selector coil 'SC' needs to be energized prior to the closing coil for which a similar rectified voltage (approx 230V DC) should appear across terminals 4 & 5 (Refer Fig. 3) of the PCB.
- b. If application of an AC voltage across B1 & B2 does not result into a rectified output between 4 & 5, the control wiring between PCB and the auxiliary switch (AX-BX) need be checked including any termination/operation issue related with the aux switch, else the PCB may have developed a defect. If the rectified voltage is appearing across terminals 4 & 5, the selector coil should get energized unless the coil is open or burnt.
- c. The energizing of selector coil further results into closing of limit switch (LS) next to it which in turn initiates the rectified output for closing coil at terminals 1 & 2. Balance of diagnosis is identical to previous fault section related to ATS not closing towards source-I as output from terminals 1 & 2 energizes the closing coil for the ATS to close this time to source-II (since the selector coil is already energized).

Fault: Tripping to neutral position is not taking place in the event of either of the sources-I and/or II being available:

- a. Close switch manually towards the supply side from which it is not tripping and connect 230 Volts AC (or battery supply* in installations where ATS tripping is initiated by battery) to the respective trip input terminals (AT1 & AT2 in case of source-I or BT1 & BT2 in case of source-II). Then check whether a DC Voltage (approx 230V or battery voltage*) is appearing between the PCB terminals 6 & 7 is DC .
- b. Presence of DC voltage on the above checks indicates that the relevant portion of the PCB assembly is in working order and the fault could be with the Tripping coil or the wiring routed through the auxiliary switch (AX/BX). If the trip coil is not showing continuity, or is showing signs of burning, it should be replaced. Else, the wiring should be checked for continuity or loose terminations followed by the auxiliary switch (AX/BX).

* Please note that the DC voltage across terminals 6 & 7 of PCB may be equal to the voltage of the battery in case of some versions of ATS that are controlled by battery supply.

EXTERNAL VIEW WITH IDENTIFICATION OF PARTS:



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

1. INSTRUCTIONS FOR STORAGE AND HANDLING:

a. Inspection upon receipt:

Upon receipt of the product at the site, kindly ensure that the ratings, i.e., rated current and control voltage etc. specified on the nameplate of the ATS delivered, match with the requirements of the installation to be done. Although best efforts are made to ensure that the ATS is dispatched by a suitable mode of transport, it should, however, be inspected for any kind of damage or distortion caused during transportation.

b. Storage and Handling:

If an ATS is not expected to be installed/commissioned shortly upon receipt, the following points should be taken care of so that the ATS remains stored in a good condition:

- 1) It should not be stored in places exposed to high humidity and temperature. Storage under damp conditions may lead to rusting.
- 2) It should not be stored in places exposed to noxious gases and dust. Particularly, if it is expected to be stored in an area while construction work is in progress, it should be properly covered to avoid entry of sand/cement and/or dust because the combination of this dust settled on moving parts coupled with humidity in the

environment due to water sprinkled during construction can cause corrosion on various parts of the ATS which in turn can adversely affect mechanical performance/functioning.

- 3) ATS should always be placed with shortest edge of packaging in vertical direction on a flat area to avoid possibility of rolling off along the edge thereby leading to possibility of damage/breakage.
- 4) If ATS is expected to be stored for a long time, it should preferably be placed on a pallet/raised area above the ground. This would help prevent possibility of packaging absorbing moisture/dust from the ground.

c. Caution during movement/transportation:

While moving the ATS, the following points should be taken care of:

- Always choose a horizontal plane to place the ATS.
- Caution should be taken while moving the ATS to avoid subjecting it to any kind of excessive impacts that may lead to damage/breakage.

2. INSTALLATION/MOUNTING:

ATS should always be installed upright on a vertical plane so that the nameplate and other labels/markings on the front are visible and legible upright when viewed from the front as shown in Fig.1 (a & b).



Fig. 1a

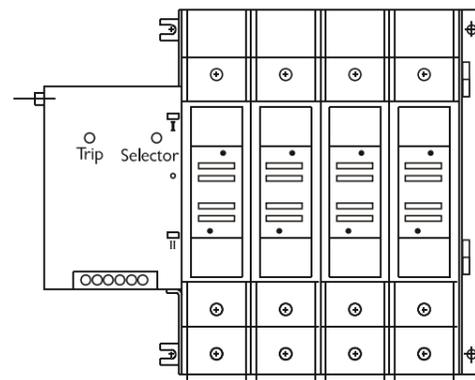


Fig. 1b

Caution: The construction and characteristics of ATS are designed according to vertical mounting direction. If the mounting direction is changed, its characteristics may change and may lead to malfunctioning such as:

- 1) While switching, the operating currents drawn by the coils can increase due to deviation of mechanical characteristic from the design criteria.
- 2) Switching time and switching capacity may change.
- 3) In some cases, the ATS may get stuck mechanically.

- f. Similarly, the operation on supply source-II may be checked by first closing it by giving momentary input of 230V AC to the terminal set B1 & B2 followed by its trip operation giving momentary input of 230V AC to the terminal set BT1 & BT2.
- g. For any problem observed on any of above four steps of checks, refer to fault finding as below.

Fault : ATS is not closing towards source-I :

When an input of 230V AC is given across terminals A1 & A2 and the ATS does not close towards source-I, the following checks need to be made working backwards from closing coil (with 230V AC applied across A1 & A2):

- a. DC (approx 230V) should be available across terminals 1 & 2 of PCB (Refer Fig. 3). If the ATS is not getting energized to close position in spite of the voltage being available across the terminals: Check the coil for being open/burnt by checking its continuity. Coil should be replaced if open/burnt.
- b. If PCB output is not ok across terminals 1 & 2, check for any loose terminations/wiring or continuity across auxiliary switches (AX-BX) as well as limit switches (LS). Else PCB shall need to be replaced.

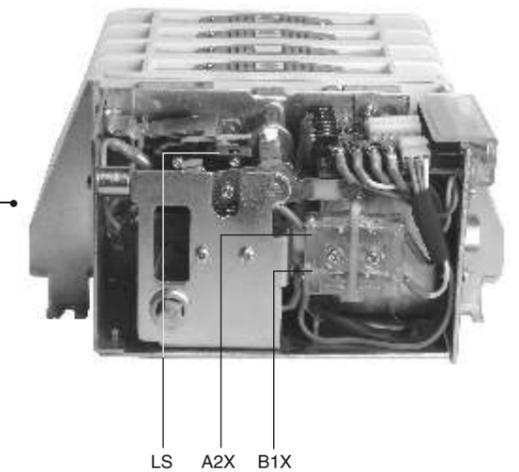


Fig 4. Auxiliary and Limit Switches

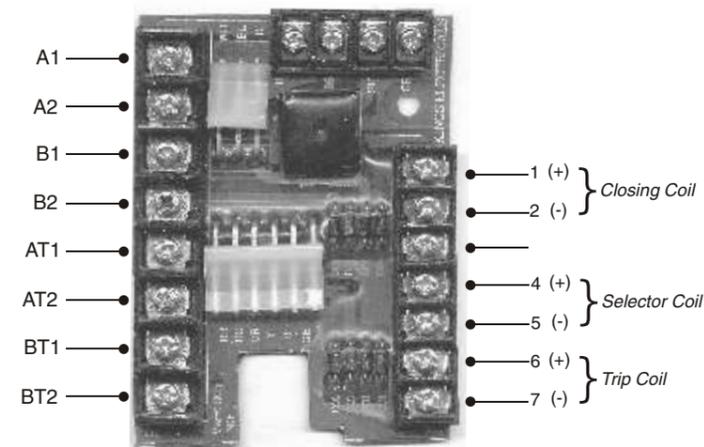


Fig 3. Terminal nomenclature for Printed Circuit Board (PCB)

c. In case the switching is taking place but is erratic on any one of the two supply sources, then it should be checked whether appropriate voltage is available on that source. One of the most common causes for erratic closing behavior on any specific supply side is insufficient voltage or voltage dip that does not allow proper current to be drawn by the switching coils.

d. In case the switching does not take place towards any of the supply modes, then ATS should be checked for operation in Auto mode as below. If the ATS is malfunctioning in auto mode as well, steps 3 detailed below should be followed for checking the electro-mechanical operation of the basic ATS unit(ATS except the controller). It should first be ensured that this electro-mechanical operation of the unit is satisfactory. Only thereafter, the checks on the control unit in either auto or manual mode(s) would give any insight into ATS controller circuit related faults.

2. Checks for the operation of the ATS with the controller in 'Auto' mode:

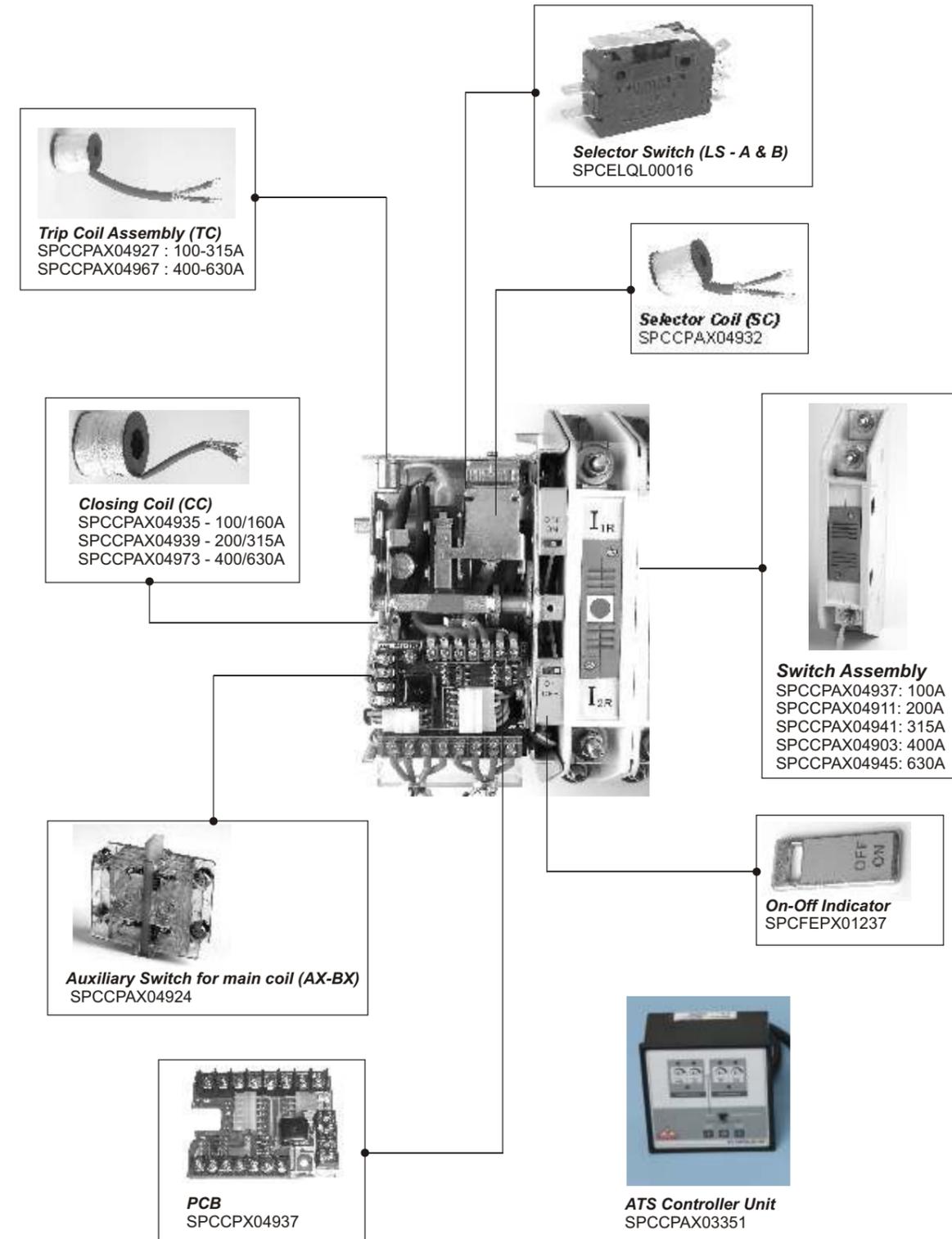
- a. It should be ensured that the ATS control unit has been set to the 'Auto' operation mode.
- b. Both the supply sources (Main/Generator) should be made available to the ATS control unit.
- c. It should be checked whether the ATS switches automatically from supply source I to backup supply source II when the supply to source I is interrupted and then switches back to supply source I when the main supply is made to resume.

3. Checks for electro-mechanical operation of the basic ATS (mechanical) unit:

- a. The wires carrying the supply from both the sources to the ATS Controller unit should be disconnected by removing the wires (L & N of mains as well as L & N of standby supply) from the back of the ATS controller unit. The loose ends of the supply wires should be properly insulated using insulation tape to ensure safety while the checks are being carried out. This will ensure that there is no phase voltage in any wiring of the control circuit of the ATS controller unit and in turn the ATS unit. However, please note that there may still be live phase(s) present at input terminals of either the mains and/or standby supplies and in turn at the output terminals of the ATS.
- b. Remove the acrylic transparent protective cover over the control circuit block (refer # 11 in figure on page 1) should be removed and thereafter all the eight control wires reaching the control circuit block be disconnected.
- c. Now the insulation tapes from one set of phase-neutral supply wires should be removed so that they can be used to provide input of 230V to any of the four sets of input terminals, viz.,A1-A2, B1-B2, AT1-AT2 or BT1-BT2.
- d. Ensure that the ATS is in OFF ('Trip') position to start with. If not, the same can be done manually.
- e. A momentary (*) input of 230V AC should be given to the terminal set A1 & A2. The ATS should close towards supply source-I (mains). Thereafter, input supply wires from A1-A2 should be removed and instead a momentary (*) input of 230V AC should be given to the terminal set AT1 & AT2. The ATS should now come back to Off ('Trip') position.

(*) Care should be taken that the momentary supply input being given should be a for fraction of a second (say, half of a second at the most) to avoid overheating of any of the coils.

3. IDENTIFICATION OF SPARES / SUBASSEMBLIES with Ordering Information:



4. ALUMINUM / COPPER CABLE / BUSBAR SIZES FOR EXTERNAL TERMINATIONS:

S No.	Rating (Amp.)	Terminal Bolt Size	Aluminum Lugs Palm Type (mm ²)	Copper Lugs Palm Type (mm ²)
1	100	M8X35 mm	50	35
2	160	M8X35 mm	95	70
3	200	M8X35 mm	150	95
4	315	M8X35 mm	240	185
5	400	M10X40 mm	300	240
6	630	M10X40 mm	*40x8x2	*40x50x2

* Busbar Size

5. FUNCTIONING OF THE BASIC ATS UNIT:

In the event of main supply being available, the ATS can be instantaneously switched ON, by the closing coil C, through terminals A1 and A2, from the OFF ('Trip') position.

If the ATS is to be closed towards the standby supply position, then it first requires to be tripped by the trip coil TC, through terminals AT1 and AT2. Thereafter, the selective coil SC is energized followed by the closing coil C getting powered through limit switches LS and terminals B1 & B2.

The Trip Coil TC, can be energised through AT1 & AT2 or BT1 & BT2 to switch off the main supply or standby supply respectively.

The feature of compulsory interim trip position in between the switching operations automatically ensures safety by eliminating the possibility of the two sources of supply becoming parallel.

The ATS controller unit available from Havell's (or a suitably designed external control circuit) can provide the required control inputs at the various coil terminals A1, A2, B1, B2, AT1, ...etc, shown in coil wiring diagram for ATS (mechanical) unit. As default, source-I is programmed to be preferred source in the ATS controller unit that would be connected to the load in the event of availability of both source I & II in healthy condition.

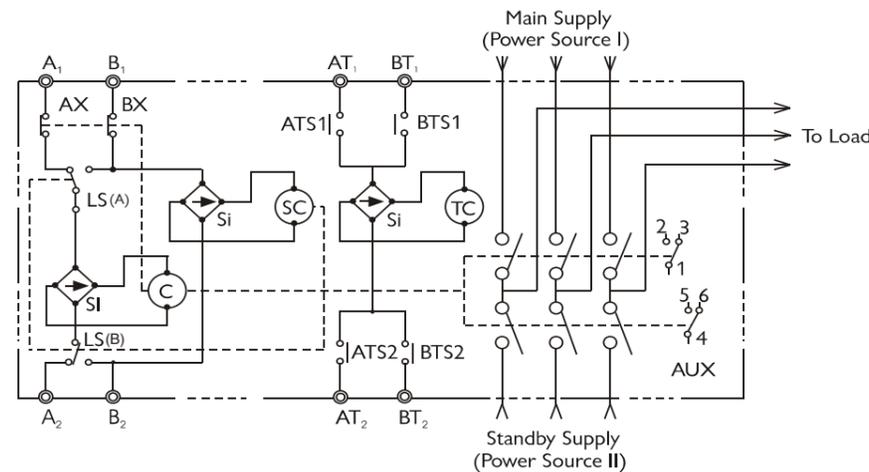
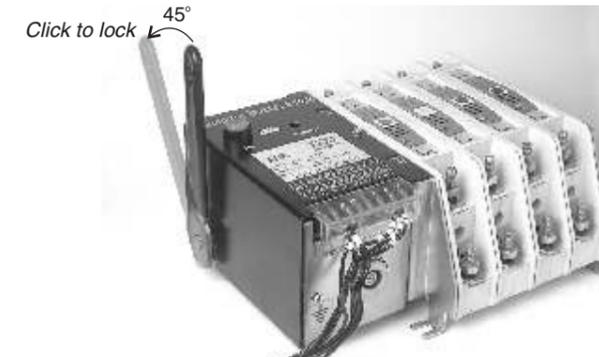


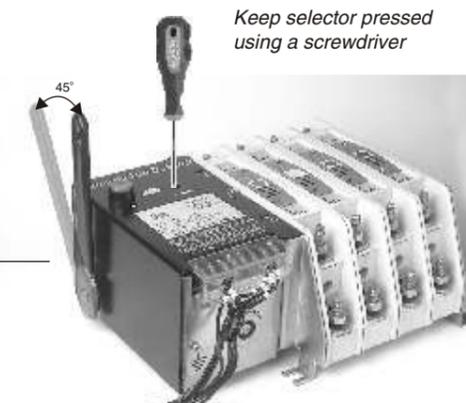
Fig: 2. Internal coil wiring diagram for ATS unit

Once the ATS is closed to either of the supply positions, the respective Auxiliary Switch (AX or BX) disconnects the closing coil C, thereby, reducing the power consumption of the coil C to zero.

6. Operating ATS in manual Mode :



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°)

7. Troubleshooting:

Fault: While supply from the source(s) I and/or II is available, changeover is not taking place automatically/ manually as expected:

1. Checks for the operation of the ATS with the controller in 'Manual/Remote' mode:

- a. It should be checked that the ATS control unit has been set to 'Manual/Remote' operation mode. The manual as well as remote operation buttons become ineffective if the ATS is in Auto mode.
- b. Both the supply sources (mains as well as generator) should be made available to the ATS control unit simultaneously and then the ATS should be switched to either one of the two modes - Source I (main supply) or Source II (generator/ standby supply) by pressing the respective buttons on the control unit. Also it should be ensured that the ATS is in 'Trip' position before it is switched to either of the two supply modes.

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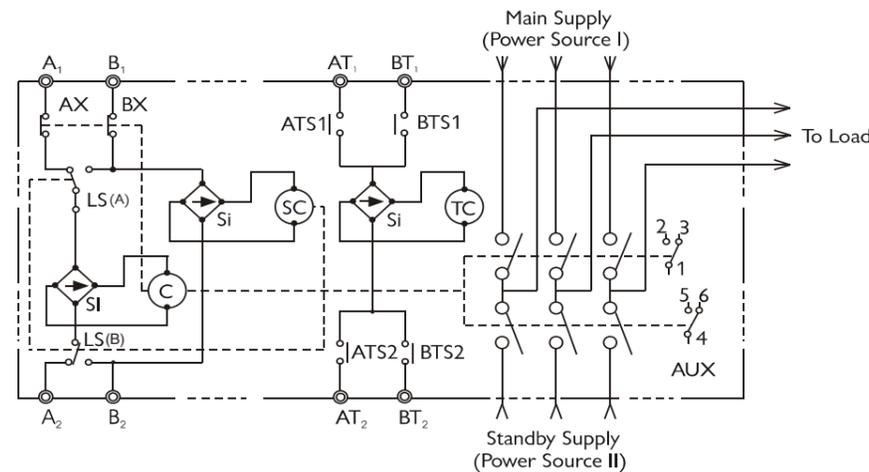
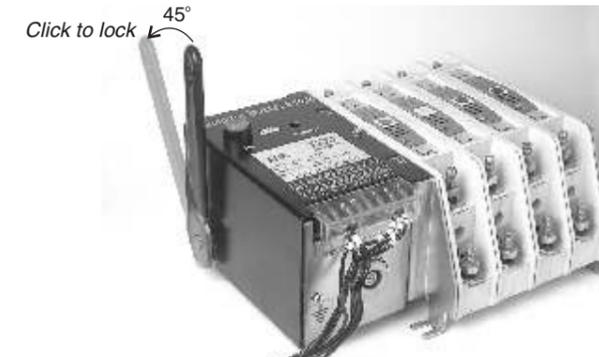


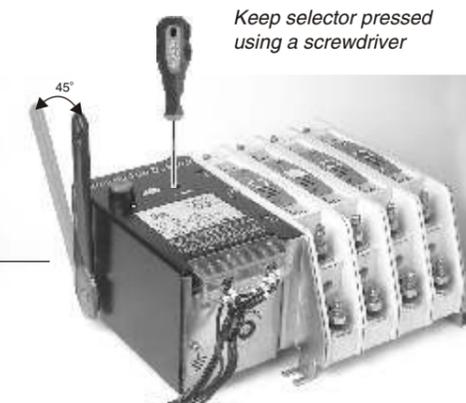
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Switch to source-I (mains) by rotating the handle upwards through an angle (approximately 45°)



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2. Switch to source-II (mains) by rotating the handle upwards through an angle (approximately 45°)

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c. In case the switching is taking place but is erratic on any one of the two supply sources, then it should be checked whether appropriate voltage is available on that source. One of the most common causes for erratic closing behavior on any specific supply side is insufficient voltage or voltage dip that does not allow proper current to be drawn by the switching coils.

d. In case the switching does not take place towards any of the supply modes, then ATS should be checked for operation in Auto mode as below. If the ATS is malfunctioning in auto mode as well, steps 3 detailed below should be followed for checking the electro-mechanical operation of the basic ATS unit(ATS except the controller). It should first be ensured that this electro-mechanical operation of the unit is satisfactory. Only thereafter, the checks on the control unit in either auto or manual mode(s) would give any insight into ATS controller circuit related faults.

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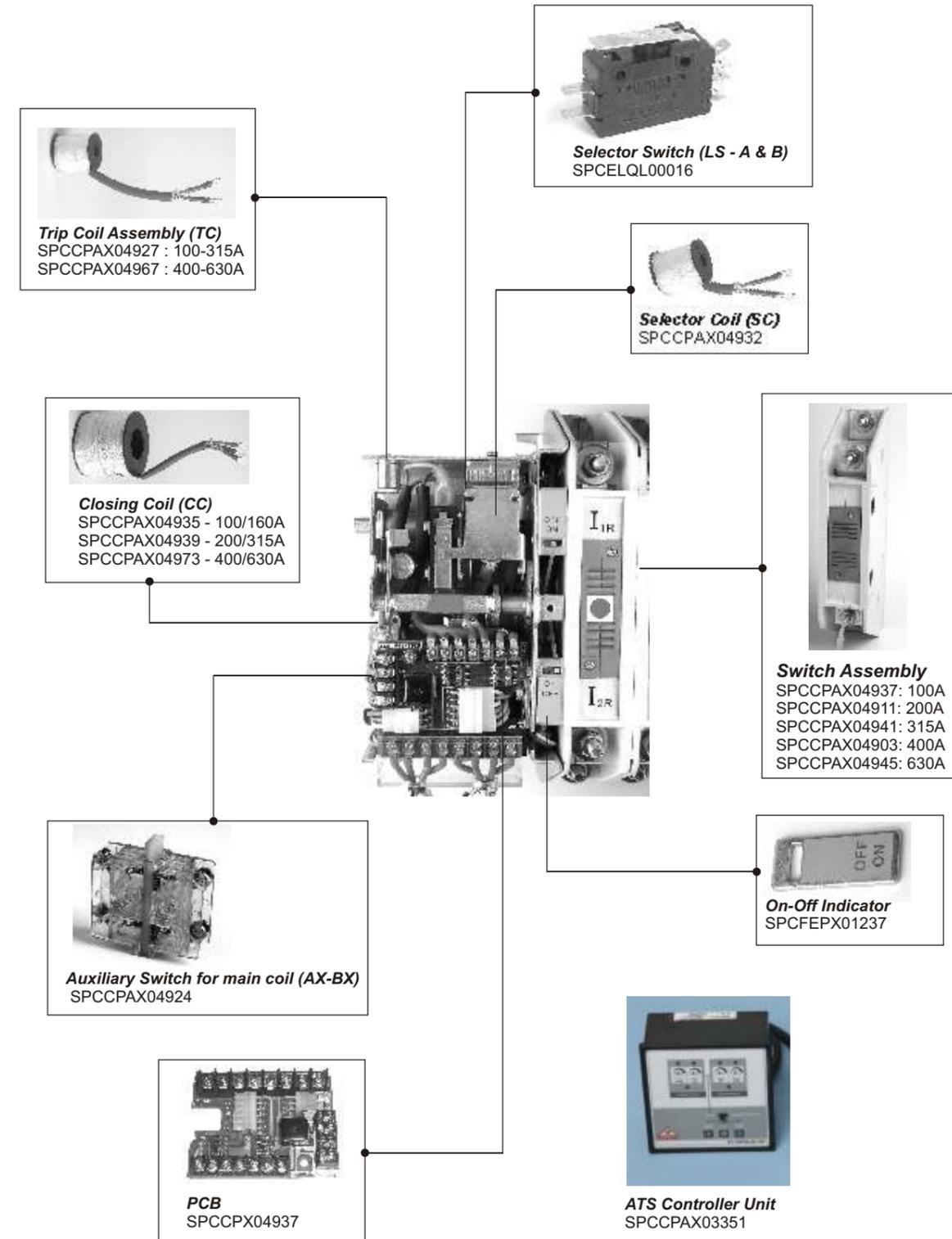
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- b. Remove the acrylic transparent protective cover over the control circuit block (refer # 11 in figure on page 1) should be removed and thereafter all the eight control wires reaching the control circuit block be disconnected.
- c. Now the insulation tapes from one set of phase-neutral supply wires should be removed so that they can be used to provide input of 230V to any of the four sets of input terminals, viz.,A1-A2, B1-B2, AT1-AT2 or BT1-BT2.
- d. Ensure that the ATS is in OFF ('Trip') position to start with. If not, the same can be done manually.
- e. A momentary (*) input of 230V AC should be given to the terminal set A1 & A2. The ATS should close towards supply source-I (mains). Thereafter, input supply wires from A1-A2 should be removed and instead a momentary (*) input of 230V AC should be given to the terminal set AT1 & AT2. The ATS should now come back to Off ('Trip') position.

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3. IDENTIFICATION OF SPARES / SUBASSEMBLIES with Ordering Information:



environment due to water sprinkled during construction can cause corrosion on various parts of the ATS which in turn can adversely affect mechanical performance/functioning.

- 3) ATS should always be placed with shortest edge of packaging in vertical direction on a flat area to avoid possibility of rolling off along the edge thereby leading to possibility of damage/breakage.
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c. Caution during movement/transportation:

While moving the ATS, the following points should be taken care of:

- Always choose a horizontal plane to place the ATS.
- Caution should be taken while moving the ATS to avoid subjecting it to any kind of excessive impacts that may lead to damage/breakage.

2. INSTALLATION/MOUNTING:

ATS should always be installed upright on a vertical plane so that the nameplate and other labels/markings on the front are visible and legible upright when viewed from the front as shown in Fig.1 (a & b).



Fig. 1a

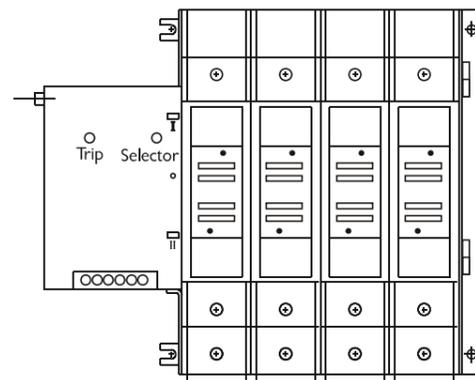


Fig. 1b

Caution: The construction and characteristics of ATS are designed according to vertical mounting direction. If the mounting direction is changed, its characteristics may change and may lead to malfunctioning such as:

- 1) While switching, the operating currents drawn by the coils can increase due to deviation of mechanical characteristic from the design criteria.
- 2) Switching time and switching capacity may change.
- 3) In some cases, the ATS may get stuck mechanically.

- f. Similarly, the operation on supply source-II may be checked by first closing it by giving momentary input of 230V AC to the terminal set B1 & B2 followed by its trip operation giving momentary input of 230V AC to the terminal set BT1 & BT2.
- g. For any problem observed on any of above four steps of checks, refer to fault finding as below.

Fault : ATS is not closing towards source-I :

When an input of 230V AC is given across terminals A1 & A2 and the ATS does not close towards source-I, the following checks need to be made working backwards from closing coil (with 230V AC applied across A1 & A2):

- a. DC (approx 230V) should be available across terminals 1 & 2 of PCB (Refer Fig. 3). If the ATS is not getting energized to close position in spite of the voltage being available across the terminals: Check the coil for being open/burnt by checking its continuity. Coil should be replaced if open/burnt.
- b. If PCB output is not ok across terminals 1 & 2, check for any loose terminations/wiring or continuity across auxiliary switches (AX-BX) as well as limit switches (LS). Else PCB shall need to be replaced.

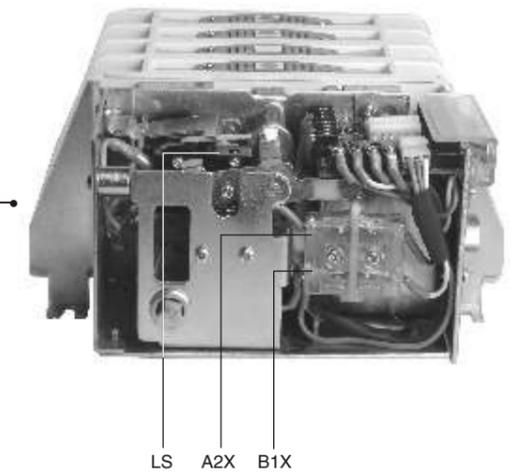


Fig 4. Auxiliary and Limit Switches

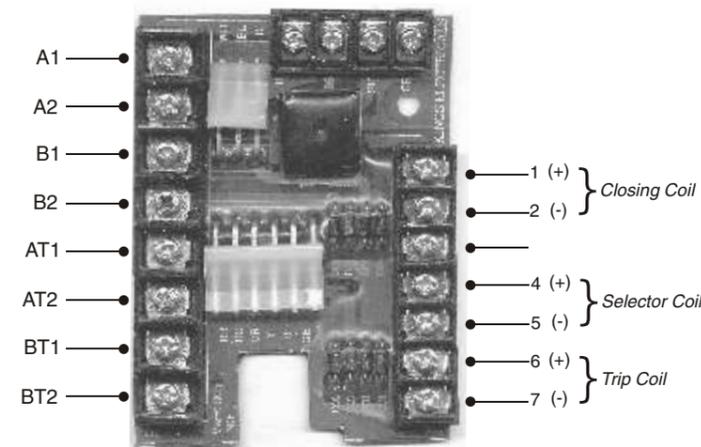


Fig 3. Terminal nomenclature for Printed Circuit Board (PCB)

Fault: ATS is not closing towards source-II whereas it is closing properly towards source-I:

When an input of 230V AC is given across terminals B1 & B2 and the ATS does not close towards source-II, the following checks need to be made (with 230V AC applied across B1 & B2):

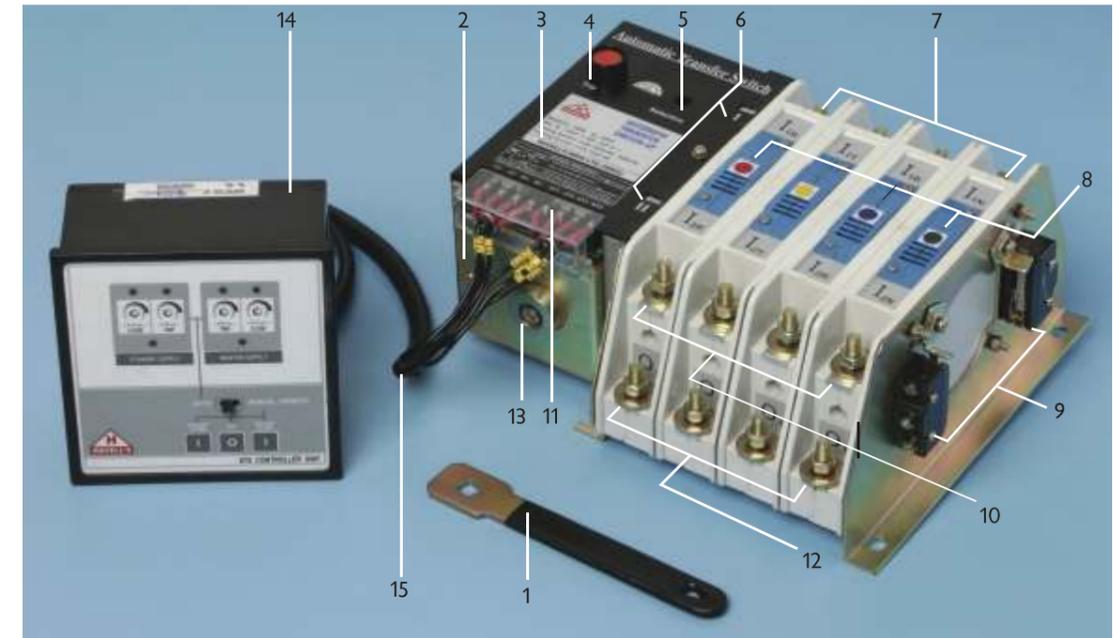
- a. In case of closure towards source-II, selector coil 'SC' needs to be energized prior to the closing coil for which a similar rectified voltage (approx 230V DC) should appear across terminals 4 & 5 (Refer Fig. 3) of the PCB.
- b. If application of an AC voltage across B1 & B2 does not result into a rectified output between 4 & 5, the control wiring between PCB and the auxiliary switch (AX-BX) need be checked including any termination/operation issue related with the aux switch, else the PCB may have developed a defect. If the rectified voltage is appearing across terminals 4 & 5, the selector coil should get energized unless the coil is open or burnt.
- c. The energizing of selector coil further results into closing of limit switch (LS) next to it which in turn initiates the rectified output for closing coil at terminals 1 & 2. Balance of diagnosis is identical to previous fault section related to ATS not closing towards source-I as output from terminals 1 & 2 energizes the closing coil for the ATS to close this time to source-II (since the selector coil is already energized).

Fault: Tripping to neutral position is not taking place in the event of either of the sources-I and/or II being available:

- a. Close switch manually towards the supply side from which it is not tripping and connect 230 Volts AC (or battery supply* in installations where ATS tripping is initiated by battery) to the respective trip input terminals (AT1 & AT2 in case of source-I or BT1 & BT2 in case of source-II). Then check whether a DC Voltage (approx 230V or battery voltage*) is appearing between the PCB terminals 6 & 7 is DC .
- b. Presence of DC voltage on the above checks indicates that the relevant portion of the PCB assembly is in working order and the fault could be with the Tripping coil or the wiring routed through the auxiliary switch (AX/BX). If the trip coil is not showing continuity, or is showing signs of burning, it should be replaced. Else, the wiring should be checked for continuity or loose terminations followed by the auxiliary switch (AX/BX).

* Please note that the DC voltage across terminals 6 & 7 of PCB may be equal to the voltage of the battery in case of some versions of ATS that are controlled by battery supply.

EXTERNAL VIEW WITH IDENTIFICATION OF PARTS:



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

1. INSTRUCTIONS FOR STORAGE AND HANDLING:

a. Inspection upon receipt:

Upon receipt of the product at the site, kindly ensure that the ratings, i.e., rated current and control voltage etc. specified on the nameplate of the ATS delivered, match with the requirements of the installation to be done. Although best efforts are made to ensure that the ATS is dispatched by a suitable mode of transport, it should, however, be inspected for any kind of damage or distortion caused during transportation.

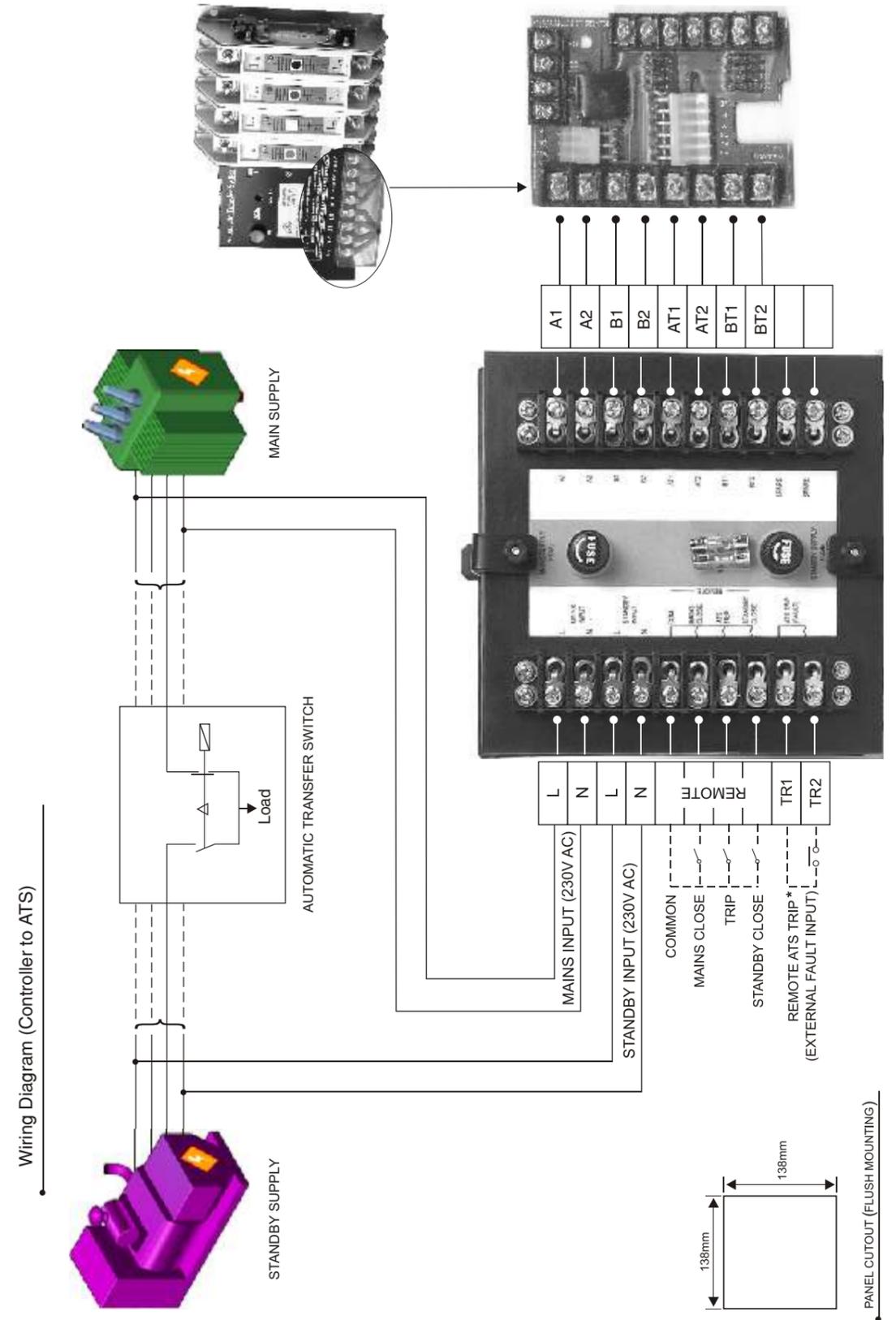
b. Storage and Handling:

If an ATS is not expected to be installed/commissioned shortly upon receipt, the following points should be taken care of so that the ATS remains stored in a good condition:

- 1) It should not be stored in places exposed to high humidity and temperature. Storage under damp conditions may lead to rusting.
- 2) It should not be stored in places exposed to noxious gases and dust. Particularly, if it is expected to be stored in an area while construction work is in progress, it should be properly covered to avoid entry of sand/cement and/or dust because the combination of this dust settled on moving parts coupled with humidity in the

Contents

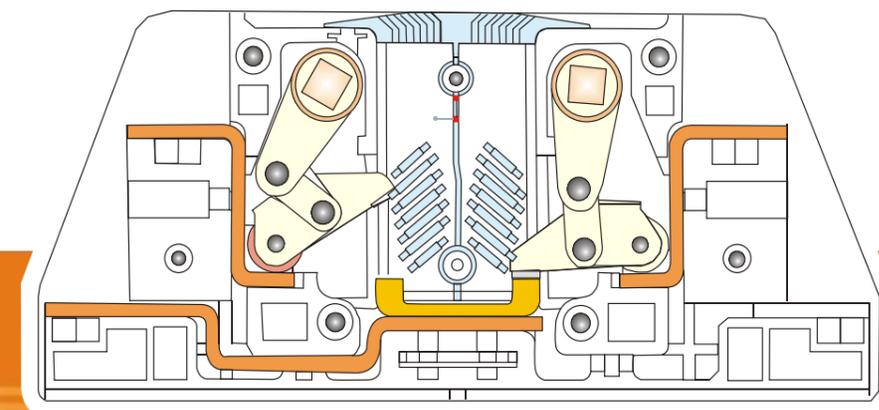
External View with identification of parts	1
Instructions for storage and handling	1
Installation / mounting	2
Identification of spares / subassemblies	3
Ordering information for spares	3
Aluminum/Copper Cable/Bus Bar Sizes for external terminations	4
Functioning of the ATS Unit	
Internal coil wiring Diagram	4
Operating ATS in manual Mode	5
Troubleshooting	5
Wiring Diagram (Controller to ATS)	9



* Remote Tripping Option can be used for Tripping from a wired Remote location, e.g., in case of AMF Control Supply (Potential Free input to be given through a Relay in case of any fault sensed by AMF Panel)

INSTALINE

Automatic Transfer Switch



Instruction Manual

Automatic Transfer Switch



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