BY-PASS ATS

OSS-PSB-PC or PSO

INSTRUCTION AND MAINTENANCE MANUAL

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1. Safety Notice

These Safety Notice describes the important information for safety. Before commencing installation or operation of this equipment, Please read all notices very carefully and note the details.

These safety notices are devided as “Danger” and “Caution” according to the hazard level.

Danger

Emergency situation, which may cause death or serious disaster if there is mistake.

Caution

A potentially problematic situation, which may cause slight personal injury and/or damage.

1.1 Transportation Precaution

Danger

- Do not enter the area under the By-pass ATS when it is lifted or suspended using a lifter or chain block. The By-pass ATS may suddenly drop.
  The By-pass ATS is heavy. Entering such an area may cause serious injury.

1.2 Installation Precaution

Caution

- Installation should be performed by qualified persons.
- Prior to commencing any installation, open the upstream circuit breaker to isolate all power/voltage sources.
  Otherwise, electric shock may occur.
- Tighten terminal screws securely according to the specified torque.
  Otherwise, a fire may occur.
- Fix the By-pass ATS firmly on a flat level using mounting screws.
- Do not place the SMART-A Controller in such area of high temperature, high humidity, dusty air, corrosive gas, strong vibration and shock or other unusual condition.
  Otherwise, a fire or malfunction may occur.
- Be careful to prevent foreign material of debris, concrete powder, iron powder, etc and rainwater from entering into the SMART-A Controller.
  Otherwise, a fire or malfunction may occur.

1.3 Operation Precaution

Danger

- Do not touch the live terminal parts.
  Otherwise, electric shock may occur.
- Do not leave the By-pass ATS in the drawout position.
  The By-pass ATS is heavy. Dropping the By-pass ATS could cause serious injury.

Caution

- When By-pass ATS will be drawn-in or drawn-out, Draw-in or draw-out after confirming Open status.
  Otherwise, This may cause the damage or fire.

1.4 Maintenance and Inspection Precaution

Caution

- Maintenance, inspection or components replacement should be performed by qualified persons.
- Prior to commencing any work, open the upstream circuit breaker to isolate all power/voltage sources.
  Otherwise, electric shock may occur.
- Retighten the terminals of main circuit with standard torque periodically.
  Loosening may cause a fire.
- Retighten the terminals of control circuit periodically.
  Loosening may cause malfunction.
- Be sure to reinstall the arc chute if removed.
  Failure to do so or incorrect installation may result in a fire or cause of burns.

2. Normal/Special Service Condition

2.1 Normal Service Condition

By-pass ATS should be used under following normal condition unless otherwise specified.

a) Ambient temperature ;
-10℃ ~ +60℃

b) Altitude ;
Below 2,000m

c) Environmental conditions ;
Relative humidity shall be less than 85% at max. temp. +40℃, less than 90% at 20℃. It shall not be allowed to use or store within the area of petrochemicals, ammonia or corrosive gas. (H2S $\leq$ 0.01ppm, SO2 $\leq$ 0.01ppm, NH3 $\leq$ a few ppm)

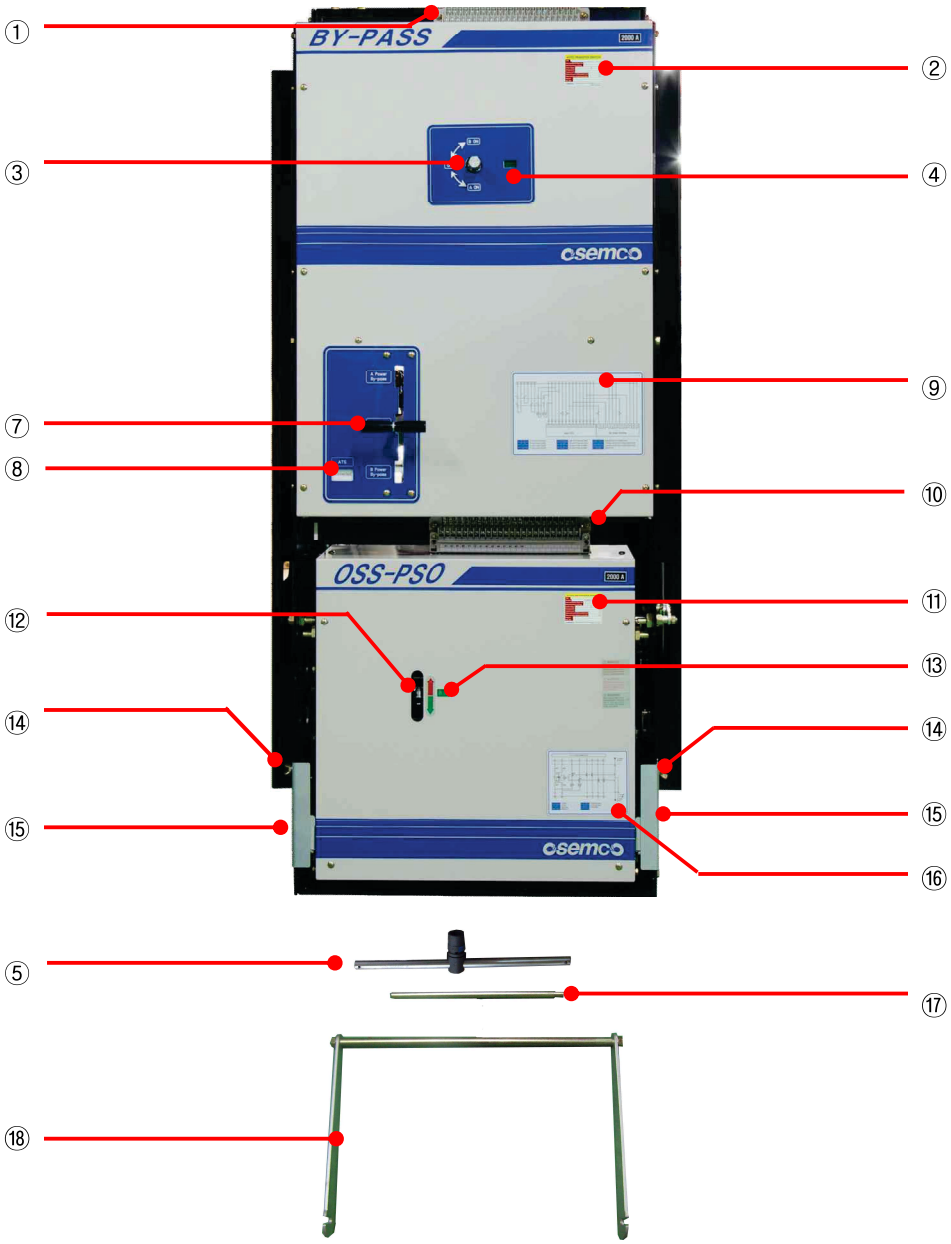
d) Storage temperature ;
-20℃ ~ +60℃

2.2 Special Service Condition

In the case of special service condition, Modified By-pass ATS are available.
Please specify when ordering. Service life may be reduced depending on the service condition.

- Where ambient temperature or altitude is severe than conditions in above 2.1.
- Where heavy offshore wind blows.
- Where always high humid.
- Where are excessive water vapor or oil vapor.
- Where are explosive, flammable or noxious gas.
- Where are heavily dusty.
- Except above condition, Where are abnormal or strange condition.

3. External View



By-pass Switch		Main ATS (PC or PSO)	
①	Auto Connection Terminals	⑩	Auto Connection Terminals
②	Name Plate	⑪	Name Plate
③	Manual Handle Lever	⑫	Manual Handle Inlet
④	Transfer Indicator	⑬	Transfer Indicator
⑤	Manual Handle	⑭	Drawout Locking Bolt
Control Part		⑮	Drawout Lever
⑦	Operating Lever	⑯	Circuit Diagram
⑧	Main ATS Drawout Position Indicator	⑰	Manual Handle
⑨	Circuit Diagram	⑱	Drawout Handle

4. Rated Specificatio

4.1 Main ATS (PC or PSO)

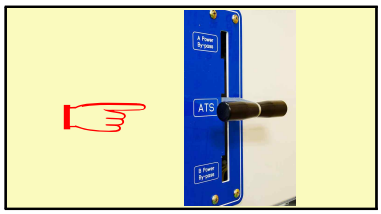
<table>
<tr><td colspan="2">TYPE</td><td colspan="2">606-PC
606-PSO</td><td colspan="2">608-PC
608-PSO</td><td colspan="2">610-PC
610-PSO</td><td colspan="2">612-PC
612-PSO</td><td colspan="2">616-PC
616-PSO</td></tr>
<tr><td colspan="2">Rated Operational Voltage Ue</td><td colspan="10">AC 600 V</td></tr>
<tr><td colspan="2">Rated insulation Voltage Ui</td><td colspan="10">AC 800 V</td></tr>
<tr><td colspan="2">Rated impulse withstand Voltage Uimp</td><td colspan="10">8 kV</td></tr>
<tr><td colspan="2">Rated Current Ie</td><td colspan="2">630A</td><td colspan="2">800A</td><td colspan="2">1000A</td><td colspan="2">1250A</td><td colspan="2">1600A</td></tr>
<tr><td colspan="2">Neutral Phase Current</td><td colspan="2">630A</td><td colspan="2">800A</td><td colspan="2">1000A</td><td colspan="2">1250A</td><td colspan="2">16050A</td></tr>
<tr><td colspan="2">Kind of Throw</td><td colspan="10">Double Throw</td></tr>
<tr><td colspan="2">Connection</td><td colspan="10">Back</td></tr>
<tr><td colspan="2">Number of poles</td><td>3 P</td><td>4 P</td><td>3 P</td><td>4 P</td><td>3 P</td><td>4 P</td><td>3 P</td><td>4 P</td><td>3 P</td><td>4 P</td></tr>
<tr><td rowspan="2">Weight (kg)</td><td>Fixed</td><td>60</td><td>70</td><td>65</td><td>75</td><td>65</td><td>75</td><td>70</td><td>80</td><td>75</td><td>85</td></tr>
<tr><td>Drawout</td><td>85</td><td>100</td><td>90</td><td>105</td><td>90</td><td>105</td><td>100</td><td>115</td><td>105</td><td>120</td></tr>
<tr><td colspan="2">Rated Short-time Withstand Current Icw</td><td colspan="6">25 kA</td><td colspan="2">30 kA</td><td colspan="2">35 kA</td></tr>
<tr><td colspan="2">Rated Short-circuit Making Capacity Icm</td><td colspan="6">52.5 kA</td><td colspan="2">63 kA</td><td colspan="2">73.5 kA</td></tr>
<tr><td colspan="2">Switching Capacity</td><td colspan="10">AC-33B(10 Ie making/10 Ie breaking cos∅=0.35)</td></tr>
<tr><td colspan="2">Switching Frequency</td><td colspan="6">60Time / Hour</td><td colspan="4">20Time/Hour</td></tr>
<tr><td rowspan="3">Operating Current

peak</td><td>DC 110~125 V</td><td colspan="6">45 A</td><td colspan="4">50 A</td></tr>
<tr><td>AC 100~110 V</td><td colspan="6">45 A</td><td colspan="4">50 A</td></tr>
<tr><td>AC 200~240 V</td><td colspan="6">30 A</td><td colspan="4">40 A</td></tr>
<tr><td rowspan="3">Operating Time</td><td>Change-over Time</td><td colspan="10">≤ 150 ms</td></tr>
<tr><td>Opening Time</td><td colspan="10">≤ 120 ms</td></tr>
<tr><td>Contact Transfer Time</td><td colspan="10">≤ 30 ms</td></tr>
<tr><td rowspan="2">Number of Operating Cycles</td><td>Without Current</td><td colspan="10">10,000</td></tr>
<tr><td>With Current</td><td colspan="10">5,000</td></tr>
<tr><td>Cautions</td><td colspan="11">1. For complete operation, Be sure to provide control source for more than 0.5sec
2. When control source will be provided to A side and B side simultaneously,
Coil may be damaged.</td></tr>
</table>

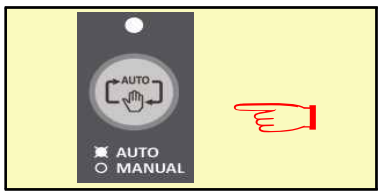
TYPE		620-PC 620-PSO		625-PC 625-PSO		632-PC 632-PSO		640-PC 640-PSO		650-PC 650-PSO		663-PC 663-PSO	
Rated Operational Voltage Ue		AC 600 V											
Rated insulation Voltage Ui		AC 800 V											
Rated impulse withstand Voltage Uimp		8 kV											
Rated Current Ie		2000A		2500A		3200A		4000A		5000A		6300A	
Neutral Phase Current		2000A		2500A		3200A		4000A		5000A		6300A	
Kind of Throw		Double Throw											
Connection		Back											
Number of poles		3 P	4 P	3 P	4 P	3 P	4 P	3 P	4 P	3 P	4 P	3 P	4 P
Weight (kg)	Fixed	90	115	95	125	100	125	180	210	195	230	200	250
	Drawout	110	140	110	140	125	155	220	175	230	285	245	305
Rated Short-time Withstand Current Icw		40 kA		50 kA				65 kA					
Rated Short-circuit Making Capacity Icm		84 kA		105 kA				143 kA					
Switching Capacity		AC-33B(10 Ie making/10 Ie breaking cos∅=0.35)											
Switching Frequency		10Time/Hour											
Operating Current peak	DC 110~125 V	65 A						80 A					
	AC 100~110 V	65 A						80 A					
	AC 200~240 V	50 A						65 A					
Operating Time	Change-over Time	≤ 150 ms											
	Opening Time	≤ 120 ms											
	Contact Transfer Time	≤ 25 ms											
Number of Operating Cycles	Without Current	5,000						3,000					
	With Current	3,000						1,500					
Cautions	1. For complete operation, Be sure to provide control source for more than 0.5sec 2. When control source will be provided to A side and B side simultaneously, Coil may be damaged.												

5. Operation Method

5.1 Electric Manual Operation



① Check the position of “Operating Lever”.
For electric operation of Main ATS, “Operating Lever” should be positioned at ATS position.



② By pressing “MANUAL button” of CTTS-801 Controller, Proceed as Manual mode. Under Manual mode, Lamp is on.

A-Power Manual Closing Button

③ When ATS is transferred to A-side by Manual :
When pressing "A-Power Manual Closing Button" under Manual mode, Closing signal to A-side is activated for approx 1 second to transfer to A-side. When transfer to A-side is completed, Indicating lamp of A-side is on.

Caution) ATS can be transferred only when Indicating Lamp of A-Power is On. Under over-voltage, under-voltage or power failure, Buzzer will beep in short and ATS cannot be transferred.

B-Power Manual Closing Button

④ When ATS is transferred to B-side by Manual :
When pressing "B-Power Manual Closing Button" under Manual mode, Closing signal to B-side is activated for approx 1 second to transfer to B-side. When transfer to B-side is completed, Indicating lamp of B-side is on.

Caution) ATS can be transferred only when Indicating Lamp of B-Power is On. Under over-voltage, under-voltage or power failure, Buzzer will beep in short and ATS cannot be transferred.

Caution) When over-voltage or under-voltage will occur on power source where ATS is transferred under Manual mode, Buzzer will beep continously.

Caution

During electric operation, "Manual Handle" of Main ATS should not be inserted into "Manual Handle Inlet".
During electric operation, "Manual Handle" can move and cause the accident.

5.2 **Electric Auto Operation**

5.2.1 Timer Setting of Delay

After setting of CTTS-801 Controller as Manual mode, Proceed the setting of Timer.

▶ When pressing “Set button”, Buzzer will beep in short. When pressing for approx 2 seconds, Mode is changed as Setting mode.

Caution) Under setting mode, Function of Controller stops.

▶ Set Up Menu > [Timer Set up] Menu

Choose [Standby time to switch Normal A Power] Set up the delay time by pressing Up and Down button.

Choose [Standby time to switch Emercency B Power] Set up the delay time by pressing Up and Down button.

0 ~ 20min can be set by 1sec increments.

▶ Search of Setting Value

Choose Set Up Menu > [Timer Set Up] and Search of Setiing Value by pressing Up and Down button.

Caution 1) If setting button will not be pressed for 20 seconds, Setting mode will be changed as Manual mode. Without pressing "Enter button" at this time, Setting value cannot be saved.

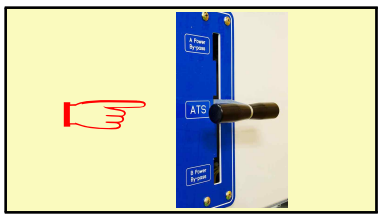
Caution 2) All initial setting value are entered as 5 seconds at factory. Setting value are recommended to reset according to customer's requirement.

Caution 3) When several switches will be connected to Generator, Sequential time delay settings of Timer to Generator is required. Otherwise, Overload can cause to Generator.

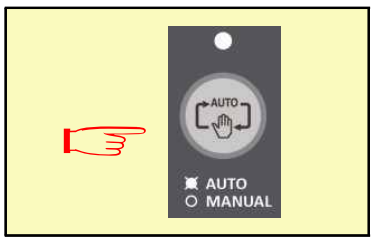
Caution

Considering the power quality against instantaneous power failure and power restoration, Time delay setting is required.
Otherwise, this can cause malfunction or damage.

5.2.2 Setting of Auto Operation



① Check the position of "Operating Lever".
For electric operation of Main ATS, "Operating Lever" should be positioned at ATS position



② By pressing "AUTO button" of CTTS-801 Controller, Proceed as Auto mode. Under Auto mode, Green Lamp is on.

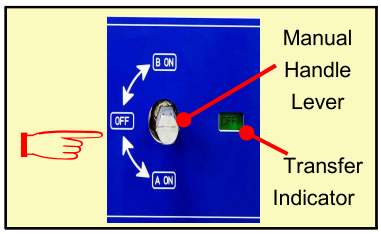
- ATS is transferred to normal source of Incoming Line or Emergency Line after delayed time setting.
- When both power source are normal, ATS is transferred according to priority setting. (See CTTS-801 Manual 5.2 System Set up)
- When both power source are not normal, ATS maintains transfer status.

Caution

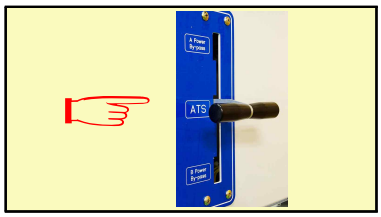
During electric operation, Manual Handle of Main ATS should not be inserted into Manual Handle Inlet.
During electric operation, Manual Handle can move and cause the accident.

5.3 **Mechanical Manual Operation of Main ATS**

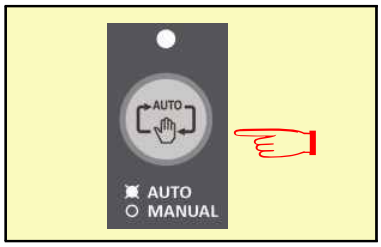
Main ATS can be mechanically manual operated for the purpose of periodic checking, maintenance or emergency action.



① Check the transfer status of By-pass Switch.
The switch position shoud be at “OFF” possition to elctrical operation of Main Transfer Switch.

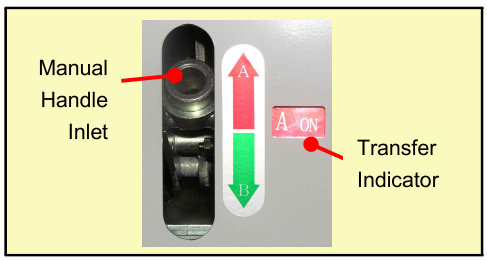


② Check the position of Operating Lever.
For electric operation of Main ATS, "Operating Lever" should be positioned at ATS position



③ Choose CTTS-801 contrller to “Manual Operation” mode

Caution) Control under Auto mode can cause accident.



④ After inserting "Manual Handle Lever" into "Manual Handle Inlet" and moving upward, ATS is transferred to A-Power. When moving downward, ATS is transferred to B-Power. When transfer is completed, Check the status of Transfer Indicator.

⑤ When ATS cannot be transferred by "Manual Handle", Check the position of Operating Lever and transfer status of By-pass Switch.

Danger

When ATS cannot be transferred by "Manual Handle", Do not operate by force.
In order to prevent from electric crash between A-Power and B-Power, Mechanical Interlocking is fitted. Operation by force may cause breakdown or electric crash.

Caution

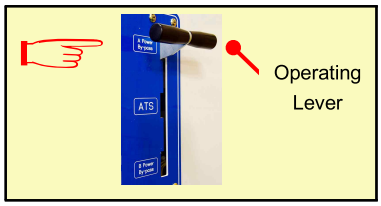
Manual transfer is recommended under no-load condition.
Arc is generated during manual transfer. This can cause the damage on contacts and accident.

5.4 **Manual Operation of By-pass Switch**

When working under uninterruptible power is needed for the purpose of periodic checking and maintenance of Main ATS, By-pass of power line is required. In this case, By-pass Switch should be operated.

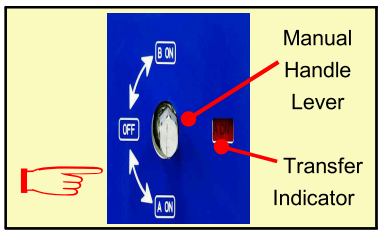
5.4.1 When Main ATS is connected to Incoming Line, How to transfer By-pass Switch manually to Incoming Line side.

① By pressing "MANUAL button" of CTTS-801 Controller, Proceed as Manual mode.



② Move "Operating Lever" upward to A-Power By-pass position. If "Operating Lever" cannot be moved upward, Check whether "Transfer Indicator" of Main ATS shows A-ON.

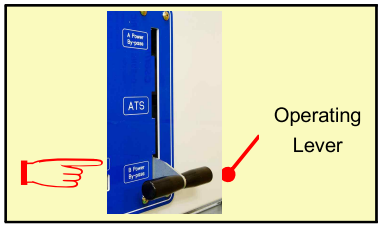
Note) When "Operating Lever" will be moved to A-Power or B-Power By-pass under Auto mode of CTTS-801 Controller, Controller will be changed as Manual mode. Then, Lamp of Manual mode is flickering.



③ Transfer the switch by using and turning Manual handle lever to A-ON(Counterclockwise)
And Check the Transfer Indicator.

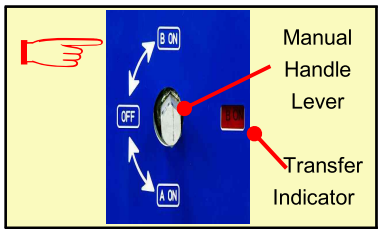
5.4.2 When Main ATS is connected to Emergency Line, How to transfer By-pass Switch manually to Emergency Line side.

① By pressing "MANUAL button" of CTTS-801 Controller, Proceed as Manual mode.



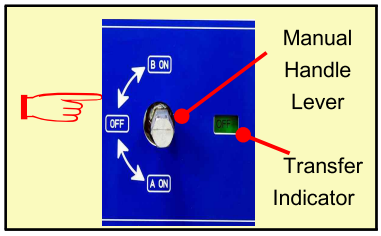
② Move "Operating Lever" downward to B-Power By-pass position. If "Operating Lever" cannot be moved downward, Check whether "Transfer Indicator" of Main ATS shows B-ON.

Note) When "Operating Lever" will be moved to A-Power or B-Power By-pass under Auto mode of CTTS-801 Controller, Controller will be changed as Manual mode. Then, Lamp of Manual mode is flickering.

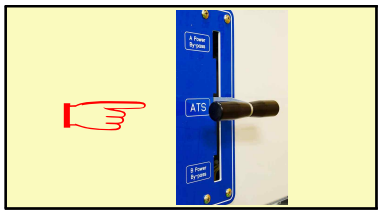


③ Transfer the switch by using and turning Manual handle lever to B-ON(clockwise)
And Check the Transfer Indicator.

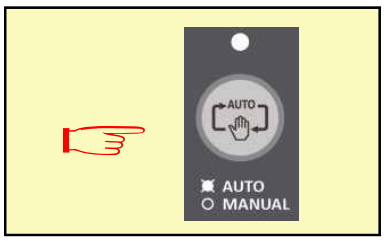
5.4.3 When load will be connected from By-pass Switch to Main ATS.



① By-pass Switch should be positioned at OFF position.



② Move "Operating Lever" to ATS position.
For electric operation of Main-ATS, "Operating Lever" should be positioned at ATS position.



③ By pressing "AUTO button" of CTTS-801 Controller, Proceed as Auto mode.

5.5 **Mechanical Interlocking to prevent from electric crash**

In order to prevent from electric crash on main circuit, Mechanical Interlocking is fitted between Main ATS and By-pass Switch.

▶ Operating Lever

◎ Positioned at A-Power Bypass :
By-pass Switch can be transferred to A-Power only.

◎ Positioned at ATS :
Main ATS can be electrically or mechanically transferred.
However, By-pass Switch cannot be transferred.

◎ Positioned at B-Power Bypass :
By-pass Switch can be transferred to B-Power only.

▶ When "Operating Lever" cannot move

◎ When "Operating Lever" cannot move to the position of "A-Power Bypass", Check the transfer status of Main ATS. "Operating Lever" can move only when Main ATS is A-ON positioned.

◎ When "Operating Lever" cannot move to the position of "ATS", Check the transfer status of By-pass Switch. "Operating Lever" can move only when Main ATS is A-ON positioned. "Operating Lever" can move only when By-pass Switch is OFF positioned.

◎ When "Operating Lever" cannot move to the position of "B-Power Bypass", Check the transfer status of Main ATS. "Operating Lever" can move only when Main ATS is B-ON positioned.


Danger

When "Operating Lever" cannot move, Do not move by force.
In order to prevent from electric crash between A-Power and B-Power, Mechanical Interlocking is fitted between Main ATS and By-pass Switch. Moving by force can cause breakdown or electric crash.

▶ When "Manual Handle" of By-pass Switch cannot move

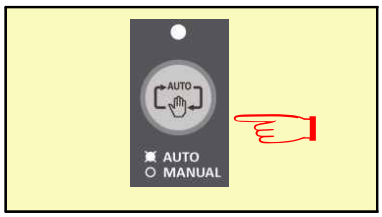
◎ When cannot move to A-Power side
Check whether Operating Lever is "A-Power Bypass" positioned.

◎ When cannot move to B-Power side
Check whether Operating Lever is "B-Power Bypass" positioned.

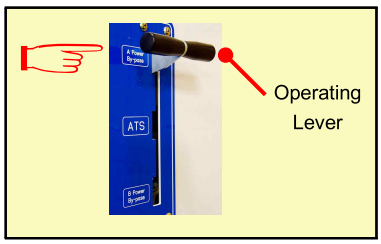
5.6 **How to draw-in or draw-out**

For the purpose of inspection or maintenance, Main ATS can be drawn-out and drawn-in.

5.6.1 How to draw-in Main ATS

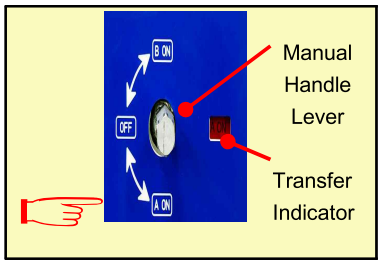


① By pressing "MANUAL button" of CTTS-801 Controller, Proceed as Manual mode.



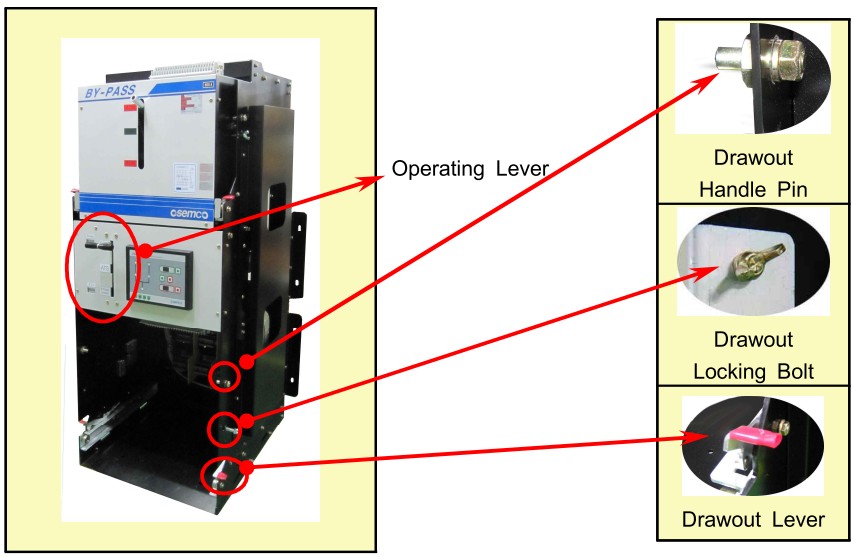
② Select A-Power By-pass or B-Power By-pass with "Operating Lever".

This manual explains based on the selection of A-Power By-pass.

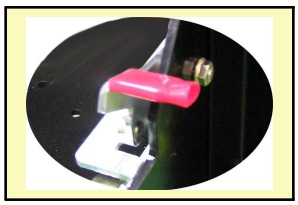


③ Transfer the switch by using and turning Manual handle lever to A-ON(Counterclockwise)
And Check the Transfer Indicator.

Caution) If By-pass Switch is at OFF position, Main ATS cannot be drawn-in because of mechanical interlocking devices.



④ Remove "Drawout Locking Bolt" from Cradle (2 PC each on left and right)



⑤ Move "Drawout Lever" upward. (1 set each on left and right)

Caution) If Main ATS will be drawn-out or drawn-in without moving "Drawout Lever" upward, This can cause the breakdown.

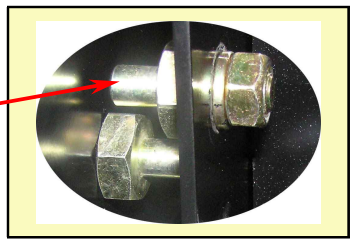
⑥ Push Main ATS into Cradle until "Drawout Lever" will move downward again.

Danger

When pushing Main ATS into Cradle, Use Lifter, etc. Pay attention that Main ATS may fall during pushing.

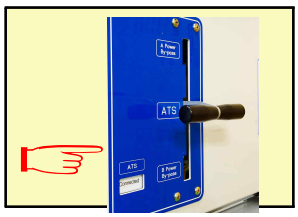
Main ATS is heavy. If fallen, Accident may occur.

⑦ Move "Drawout Lever" at both sides upward again and push Main ATS into Cradle completely.



⑧ Link "Drawout Handle" and Cradle.

⑨ Move "Drawout Handle" downward and push Main ATS into Cradle. When completely drawn-in, "Drawout Lever" will move downward.

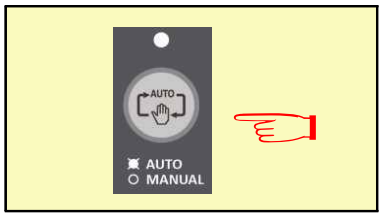


⑩ Confirm whether "Drawout Indicator" of Main ATS shows CONNECTED.

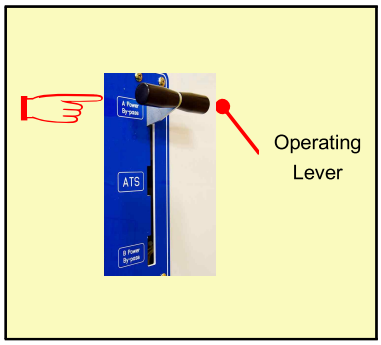
⑪ Tighten "Drawout Locking Bolt" (2PC each on left and right).

Caution) If "Drawout Locking Bolts" may not be tightened, This can cause malfunction.

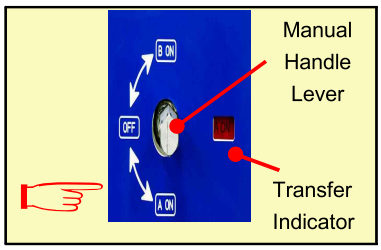
5.6.2 How to draw-out Main ATS



① By pressing "MANUAL button" of CTTS-801 Controller, Proceed as Manual mode.



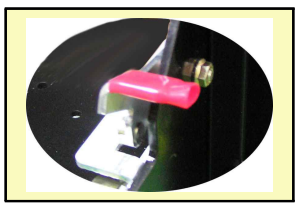
② Select "Operating Lever" so that Main ATS and By-pass Switch are parallel.
This manual explains based on the selection of A-Power By-pass.
Caution) When "Operating Lever" cannot move, Do not move by force because Mechanical Interlocking is fitted to prevent from electric crash. Forcible moving can cause breakdown or electric crash.



③ Transfer the switch by using and turning Manual handle lever to A-ON(Counterclockwise)
And Check the Transfer Indicator.
Caution) If By-pass Switch is at OFF position, Main ATS cannot be drawn-out.

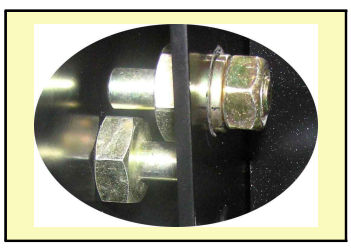
④ Remove "Drawout Locking Bolt" from Cradle
(2 PC each on left and right).

Caution) If Main ATS will be drawn-out without removing "Drawout Locking Bolt", This can cause the breakdown.



⑤ Move "Drawout Lever" upward. (1 set each on left and right)

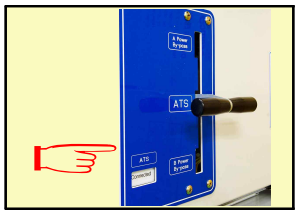
Caution) If Main ATS will be drawn-out or drawn-in without moving upward of "Drawout Lever", This can cause the breakdown.



⑥ Link "Drawout Handle" and Cradle.

⑦ Move "Drawout Handle" upward and draw-out Main ATS.

⑧ Pull forward until Main ATS stops.



⑨ Confirm whether "Drawout Indicator" of Main ATS shows DISCONNECTED.

⑩ In order to remove Main ATS from Cradle, Pull forward after moving "Drawout Lever" upward.

Danger

When removing Main ATS from Cradle, Pay attention that Main ATS may fall during removing.

Main ATS is heavy. If fallen, Accident may occur.

6. Maintenance

Reasonable care in preventive maintenance will ensure high reliability and long life of By-pass ATS. Please note this article in details and do maintenance according to following instruction. Safety caution is required during maintenance.

6.1 Every 6 month, clean the dust and oil which residue on the By-pass ATS.

6.2 Visual inspection for distortion or discolour of contacts area.

6.3 Do ON-OFF operation of By-pass ATS one(1) time for a year to check rust, oxidation or dust placed.

6.4 Check loose of bolts and nuts.

6.5 Checking requirement

Checking Class	Checking Interval	
	General Environmental	Severe Environmental
Instantaneous	1 time / 6 month	1 time / 1 month
Periodic	1 time / 1 year	1 time / 6 month
Temporary	If necessary	

6.6 Instantaneous checking.

Checking Class	Check Point
Visual Checking	• Over heat and discolour of terminal • Rusts • Dusts • Abnormal smell • Damage, breakage, distortion and discolour of insulation materials.

7. Periodic Checking

Checking item		Checking requirement	Solution and trouble shooting
Insulation Materials	Contacts enclosure & Insulation Frame.	• No damage or crack on Insulation materials ?	• Stop operation and consider to replace parts.
		• No humidity and dust is found on surface ?	• If serious humidity and dust, stop operation and clean it up.
		• Any loosen of bolts ?	• Retighten bolts as specified torque. Bolts fixing should be balanced.
		• Nor arcing scratch on insulation barrier ?	• If serious, assume damage of contacts and arching chamber. Then consider to replace those parts.
	Arching Chamber	• Serious damage on arching chamber ?	• Considered normal condition if discolour of arching chamber inside. but if insulation barrier is broken, must consider to replace those parts.
		• Serious damage of arching barrier ?	• Consider to replace those parts.
	Insulation Resistance	• Between phase and Ground • Insulation resistance of operation circuit	• 5㏁ over • 20㏁ over
Conductive Parts	Contacts	• Any damage of auxiliary contacts ?	• Light discolour, clean up busing by sand paper or file in high density. If serious, replace those parts.
		• Keep good contacts ?	• Bad contacts may cause over heating.
		• Any wrinkles or scratch on contacts ?	• As a result of over heating, discolour, flashing and smelling founded.
		• Discolouring due to over heating on contacts ?	• If serious, deep discolour and distortion occurred.
		• Any loosen bolts on contacts ?	• Loosen bolt may cause over heating, re-fixing as much as specified torque.
Driving and operation	Mechanical Drive	• Rotating and lubricant device is keeping smooth?	• Do lubricant
		• No damage or rust on rotating and lubricant device ?	• Cause incorrective operation
		• No rust and damage on springs ?	• Replace damaged parts
		• No loosen on bolts and nuts ?	• Retighten again as specified torque
		• No loosen and damage on E-ring and stopper pins ?	• Replace or fix it on right position