





## Optional accessories












### OCR tester

#### Ratings

<b>Name</b>	OT-2000
<b>Rated voltage</b>	AC 100~240V
<b>Frequency</b>	50Hz, 60Hz (selection)
<b>Output voltage</b>	$I_{n\ max}$ : (0-1) → If the value of $I_{n\ max}$ is 1, the output voltage is 200mV $I_n$ : (0-30) $\times I_{n\ max}$ → It corresponds to the signal of the OCR (Ex. If you set $I_n$ to 30, 6V turns out.)
<b>Type of output voltage</b>	o, g, e <i>Note1)</i>
<b>Stop signal</b>	OCR, a-contact, b-contact
<b>Trip time Check</b>	TC: Detect only the operation state of OCR regardless of the time delay characteristics. (Apply DC power)

#### Key operating explanation

-  **Hz** Key to select frequency (50Hz, 60Hz)
-  **SS** Key to select type of stop signal input voltage of the OCR tester (OCR, a-contact, b-contact)
-  **CL** Key to initialize the test current value when ED has been pressed one time.
-  **TC** Key to test whether OCR is operated normally or not.

-  **INIT** Key to initialize test current value ( $I_n$ ,  $I_{n\ Max}$ ) and LED(trip, testing)
-  **START** Key to start the test.
-  **STOP** Key to stop the operation of tester device (Timer, stop output signal)
-  **RESET** Key to initialize timer. (0 ms)
-  **ED** Key that should be operated at first to revise test the current value, and select type of the test current.
-  Key to shift the digit number of 7-segment, which shows the test current value to right direction
-  Key to shift the digit number of 7-segment, which shows test current value to the left direction
-  Key to increase 1 digit by 1 digit of 7-segment that shows the test current value.
-  Key to decrease 1 digit by 1 digit of 7-segment that shows the test current value.
-  **SET** Key to set the test current value edited by →, ←, ↑, ↓ or CL
-  **OP** Key to select operational characteristics of trip relay

*Note) 1. - o: Pre-alarm, long-time delay, short-time delay, instantaneous-time delay trip  
- g: Ground fault trip  
- e: Display output of contact except trip relay(Use to check the tester)*

#### Connection method



## Auxiliary contact(AX)

- To remote supervisory of the ON/OFF state of the ACB

### Ratings

Type		Standard type		High capacity type		Remark	
		Resistive load	Inductive load	Resistive load	Inductive load		
Contact capacity	AC	460V	5A	2A	5A	2.5A	
		250V	10A	10A	10A	10A	
		125V	10A	10A	10A	10A	
	DC	250V	0.3A	0.3A	3A	1.5A	
		125V	0.6A	0.6A	10A	6A	
		30V	10A	6A	10A	10A	
Maximum contact No.	AX	5a5b		-		Standard charging type	
	HX	-		5a4b			
	AC	5a5b		-		High speed reclose charging type	
	HC	-		5a5b			
Selection		Standard offer <i>Note)</i>		Option			

*Note)* When you order the high capacity type auxiliary contact, the standard type auxiliary contact is not offered.

### • Contact operating

The condition of ACB	a-contact	b-contact
ON	ON	OFF
OFF	OFF	ON

## Cell switch(C)

To indicate the position (connected, test, dis-connected) of a ACB

It is installed in the upper and back side of a cradle.

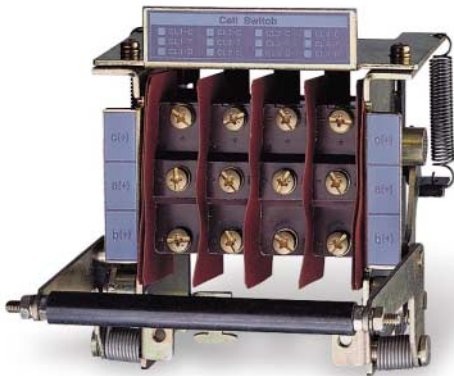
(Common use 630~5000A)

### Standard contact configuration

- 4C: 1 Disconnected 1 test 2 connected

- 8C: 2 Disconnected 2 test 4 connected (4C × 2EA)

※ Please change contact configurations if you needed



ACB position		DISCONNECTED		CONNECTED	
Draw-in and draw-out position		DISCONNECTED	TEST	CONNECTED	
Contact operation	CL-C (CONNECTED)	OFF		ON	
	CL-T (TEST)	OFF	ON	OFF	
	CL-D (DISCONNECTED)	ON	OFF		
Contact capacity	Voltage (V)	Resistive load		Inductive load	
		AC	460	5	2.5
			250	10	10
	DC	125	3	1.5	
		125	10	6	
		30	10	10	
Contact number		4C			

*Note)* The number of maximum contact: 8C (if needed)

## ON/OFF button lock(B)

To protect mis-operation of the ON/OFF button of ACB (common use 630~5000A)

## Miss insertion prevent device (MIP)

When the ratings of ACB and cradle does not match, this device mechanically prevent the ACB from being inserted into the cradle of ACB (common use 630~5000A)

# Optional accessories

## Undervoltage trip device(UVT)

To trip the ACB automatically when the voltage of main power or control power source reduces below its normal value. It consists of UVT coil and UVT controller.

UVT is attached to the inside of main body and UVT controller left side of the main(Fixed type) or cradle(Draw-out).

In addition, external output contact(1a1b),which can use UVT operation as external control signal, is supplied.

\* For control power use, please apply AC power only.

### UVT ratings

Type	Name	Rated voltage	Operating time	UVT out put contact	Pick-up voltage	Drop-off voltage				
Instantaneous type	V1	AC 110V	0.2sec under	1c	Over 85% of the rated voltage	Under 70% of the rated voltage				
	V2	AC 220V								
	V3	AC 380V								
	V4	AC 460V								
	E1	DC 24V								
	E2	DC 48V								
	E3	DC 110V								
Time delay type	E4	DC 125V	0.5sec over	1c	Over 85% of the rated voltage	Under 70% of the rated voltage				
	T1	AC 110V								
	T2	AC 220V								
	T3	AC 380V								
	T4	AC 460V								
	F1	DC 24V								
	F2	DC 48V								
	F3	DC 110V								
	F4	DC 125V								
	D1	AC 110V					3sec over	-		
	D2	AC 220V								
	D3	AC 380V								
	D4	AC 460V								



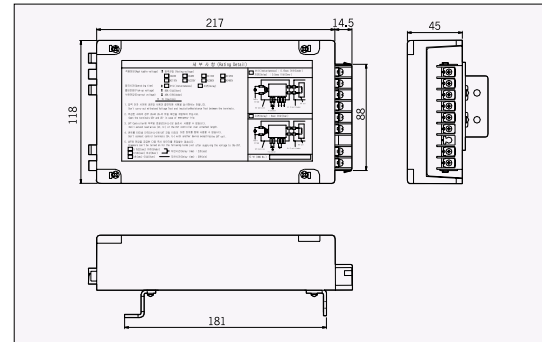
**Caution** In case of resetting or testing UVT device, please do not maintain 'ON' status of push button for a long time, and besides do not operate often ON/OFF. It can be cause of damage.  
(Maintenance duration of 'ON' status : Under 1 second, ON/OFF Cycle : Under 30 Seconds)

### Ratings of UVT output contact

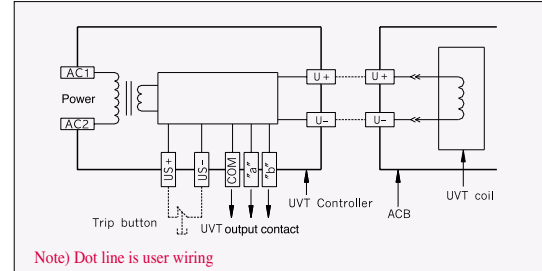
Type	Resistance load	Inductive load	Remark
Voltage	AC 125V	5A	Magnetic maintenance type
	DC 30V	5A	

### Dimension & Circuit diagram of UVT

#### • UVT controller outline dimension



#### • UVT circuit of instantaneous type and 0.5 sec time delay type



#### • How to use US+, US-

##### 1) Test Function

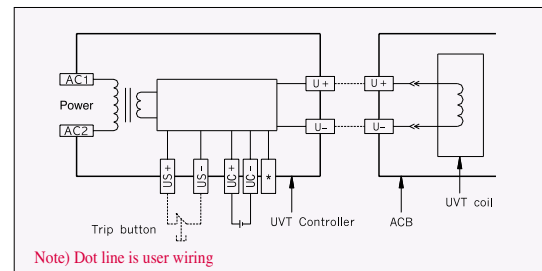
As shown in above circuit diagram, please organize push button.

During the operation in normal status, UVT unit will operate in a normal way if push button will be On. And, user can check the normal operation of UVT unit.

##### 2) Reset (Initialization Function)

A Formation of Circuit diagram and an operation method is as same as instruction explained in Test Function clause. It is a function for initialize function of UVT when user draws out ACB and then put it in original position in the status of normal operation.

#### • UVT circuit of 3 sec time delay type



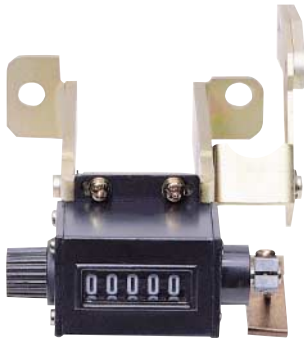
## Key lock(K1)

To compulsorily prevent specific breaker from charging(ON) or trip(OFF) when two or more breakers are used together by interlocking  
-K1: Mechanical ON protection



## Counter (C)

To mechanically indicate the times of ON/OFF operation of breaker



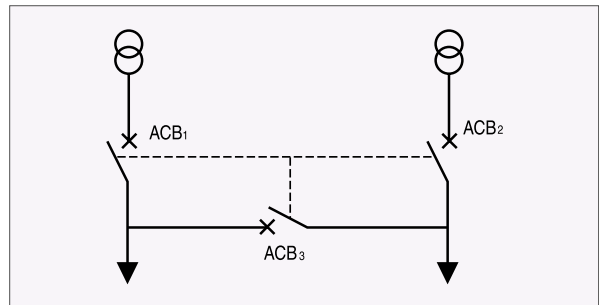
## Dust Cover (DC)

Dust cover let us see the front side of air circuit breaker due to transparency cover and protect from various pollutions.



## Key interlock(K2)

It consists of 3 breakers to supply power stably and it is possible to construct key interlock by using key lock attached to the inside of each breaker

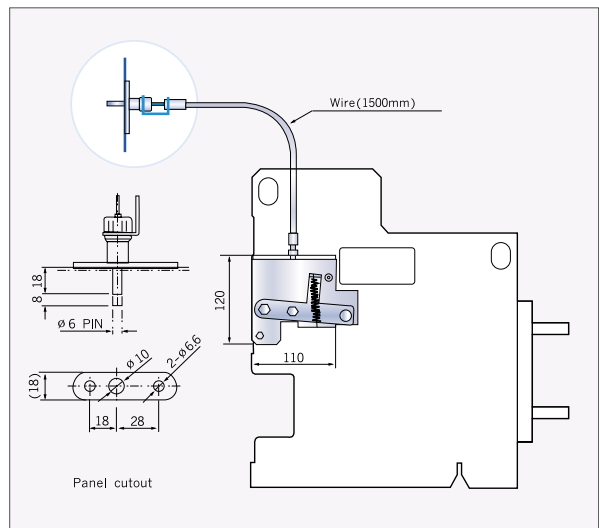
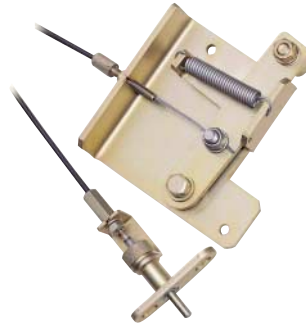


### • Operational condition

ACB <sub>1</sub>	ACB <sub>2</sub>	ACB <sub>3</sub>
ON	ON	OFF
OFF	ON	ON
ON	OFF	ON

## Door interlock(DI)

To prevent the panel door from opening when the breaker is ON



# Optional accessories

## Shorting b-contact (SBC)

It is the contact to maintain the external control circuit normal condition by disconnection of Axb of auxiliary contact when the position of air circuit breaker is moved from connected position to test position.

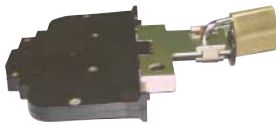
The number of shorting b contact is the same with the number(5b) of the auxiliary contact Axb of air circuit breaker.

### • B6~B10 contacts(Linkage between Axb and short "b")

ACB condition ACB position	Close position [Auxiliary contact (Axb) : ON]	Open position [Auxiliary contact (Axb) : Off]
Connected position (Shorting b contact : OFF)		
Test position (Shorting b contact : ON)		

## Safety shutter lock(STL)

To fix safety shutter for the safety during the operation in draw-out state of a breaker.



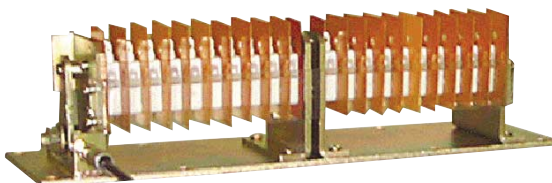
## Door frame (DF)

It is the device to look fine after the cut of a switchboard door when the breaker is installed. It helps to check the front of a breaker from the outside of a distributing board easily

※ Please refer to door frame in 41, 42, 45, 46page.

## Mechanical operated cell switch (MOC)

The ACB mechanically operates, only in case of "connected" position of its main board, so as to display its ON/OFF condition by contact 10a and 10b. Both Standard and large types are available. The contact capacity is identical with the rated auxiliary contacts in page 26.



## Condenser trip device (CTD)

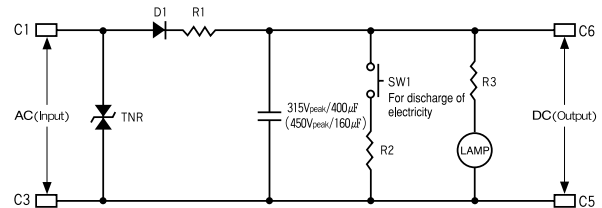
To trip the breaker electrically within regular time when the control power source is off. It is used with Shunt Coil(SHT).

If there isn't DC power, it is possible to supply the power to ACB by rectifying the AC power.

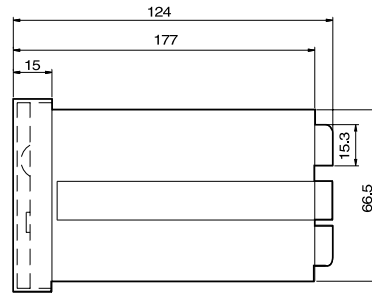
### • Ratings

Ratings	Specification	
Type name	CTD-100	CTD-200
Rated input voltage(V)	AC 100/110	AC 200/220
Frequency(Hz)	50/60	50/60
Rated charge voltage(V)	140/155	280/310
Charging time	Within 5sec	Within 5sec
Tripping time	over 3min	over 2min
Range of input voltage(%)	85~110	85~110
Condenser capacity	400 $\mu$ F	160 $\mu$ F

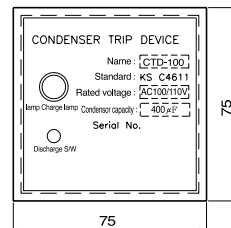
### • Circuit diagram



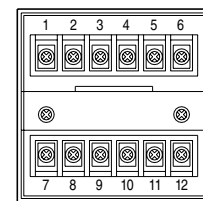
### • Outline dimension



<Side view>



<Front view>



<Rear view>

# ATS with ACBs

Interlock can be composed only of an electric driven charge type circuit breaker and there are two kinds of bar type and wire one. And in order to incorporate electric Interlock , ATS control is required separately. Electric Interlock charge closing mode, voltage trip coil, closing coil, auxiliary contactor and charge complete contactor are elements for basic composition of ACB.

## ATS controller rating

As an operation voltage of ATS Controller it operates a motor of circuit breaker so an operation voltage of ATS controller and an operation of circuit breaker shall be used in the same way.

Model Name	ATSC-110	ATSC-110-C	ATSC-220	ATSC-220-C
Rated voltage	AC110V		AC220V	
Usable voltage range	AC 93.5(±5%)~126.5V(±5%)		AC 187(±5%)~253V(±5%)	
Frequency	50Hz/60Hz			
Consumption power(wave phase)	15.4W			
4-Position switch(stop,N, R, Auto)	■	■	■	■
Test function	■	■	■	■
Transmitter control function	■	■	■	■
NRS function	■	■	■	■
Time setting(T1~T6)	■	■	■	■
Fault function(OCR/Circuit breaker trouble)	■	■	■	■
Output contact(auto, load )	■	■	■	■
Communication function (RS-485)	-	■	-	■



- T<sub>1</sub> : At the time when EPCO UN is OFF the delayed time until Generation start-up signal is closed (t<sub>1</sub> : 0.1, 0.5, 1, 2, 4, 8, 15, 30, 40, 50 seconds)
- T<sub>2</sub> : At the time when EPCO UN is ON the delayed time until ACB<sub>2</sub> is tripped (OFF) (t<sub>2</sub> : 0.1, 1, 2, 4, 8, 15, 30, 60, 120, 240 seconds)
- T<sub>3</sub> : At the time when ACB is tripped(OFF) the delayed time until ACB<sub>2</sub> is inputted(ON) (t<sub>3</sub> : 0.5, 1, 2, 5, 10, 15, 20, 25, 30, 40 seconds)
- T<sub>4</sub> : At the time when ACB<sub>2</sub> is tripped(OFF) the delayed time until ACB<sub>2</sub> is inputted(ON) (t<sub>4</sub> : 0.5, 1, 2, 5, 10, 15, 20, 25, 30, 40 seconds)
- T<sub>5</sub> : At the time when ACB<sub>2</sub> is tripped(OFF) the delayed time until Generation start-up signal contactor is opened (t<sub>5</sub> : 60, 120, 180, 240, 300, 360, 420, 480, 540, 600 seconds)

- Stop-mode : In a state that UN (EPCO power) or UR(The Power , Station power) is usable a mode that ACB<sub>1</sub>(EPCO Circuit breaker) and ACB<sub>2</sub> (The Power Station circuit breaker) are tripped (OFF).
- N-mode : In a state that UN (EPCO power) is usable a mode that ACB<sub>1</sub>(EPCO circuit breaker) is inputted (ON) artificially -UR (The Power Station power) is not related to ON or OFF state and if converting into N-mode during use of UR (The Power Station power) Generation start-up signal is opened.
- R-mode : In a state that UN (EPCO power) is usable or not a mode that ACB<sub>2</sub>(The Power Station circuit breaker) is inputted (ON) artificially in a state that UR(The Power Station power) is usable
- Auto-mode : A mode that unusable power (UN or UR) circuit breaker is tripped (OFF) or usable power circuit breaker is inputted (ON) according to unusability or usability of UN (EPCO power) or UR (The Power Station power).

Note) EPCO: Electric Power Co.

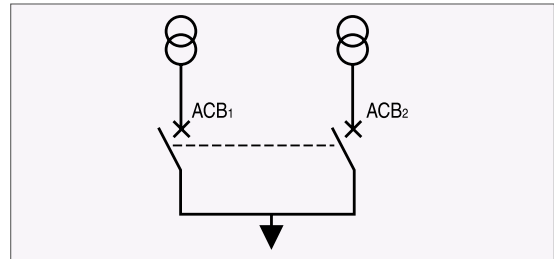
# ATS with ACBs

## Operational condition

### In case of using 2 ACBs ATS Controller

- If 1(One) of 2(two) connected ACBs is ON, the other is not ON electrically and mechanically by interlock.
- Operational condition

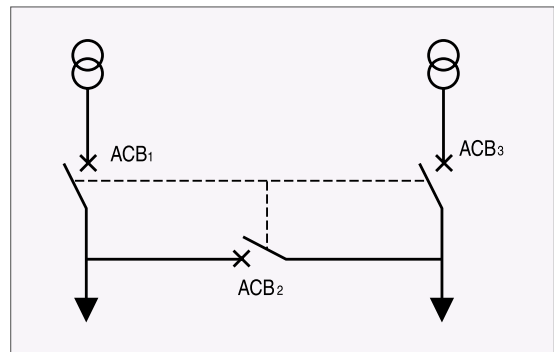
ACB1	ACB2
OFF	OFF
ON	OFF
OFF	ON



### In case of using 3 ACBs Non-ATS Controller

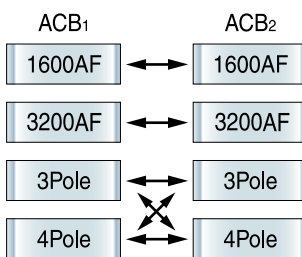
- If 2(two) of 3(three) connected ACBs are ON simultaneously, the other is not ON electrically and mechanically by interlock.
- Operational condition

ACB1	ACB2	ACB3
OFF	OFF	OFF
ON	OFF	OFF
ON	ON	OFF
OFF	ON	ON
OFF	OFF	ON
ON	OFF	ON



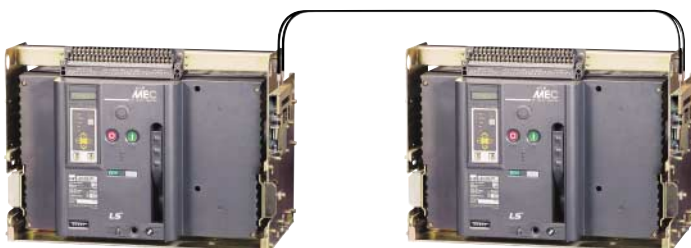
## Interlock method

### Bar type



### Wire type

Interlock is possible regardless of the Ampere Frame sizes and the number of poles. Standard length of wires are 1.8 meters



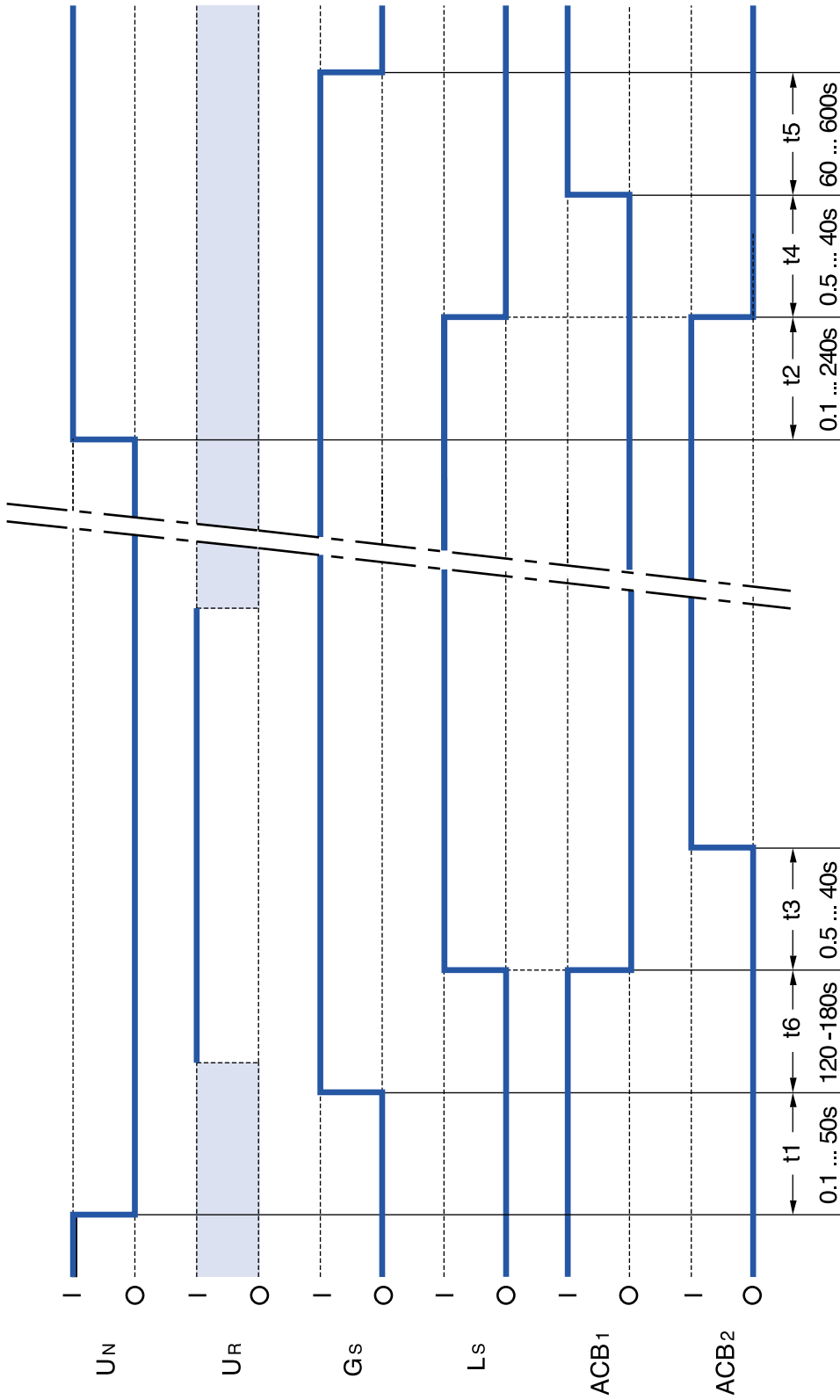
<Wire Type>



<Bar Type>



## Time chart



- \*  $U_N$ : Main power(normal power)
- \*  $U_R$ : Emergency power (standby power)
- \*  $G_s$ : Generator start-up signal
- \*  $L_s$ : Load shedding
- \*  $ACB_1$ : N-side breaker(normal breaker)
- \*  $ACB_2$ : R-side breaker(stand-by breaker)

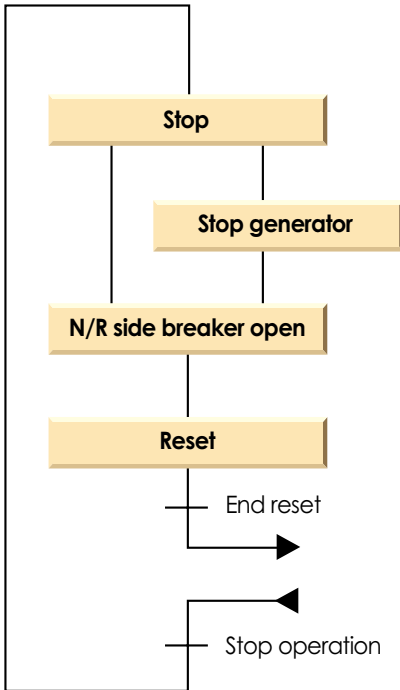
- \* **symbol explanation**
- **I position**: circuit close
- **O position**: circuit open
- : there is no effect whether the condition is ON or OFF



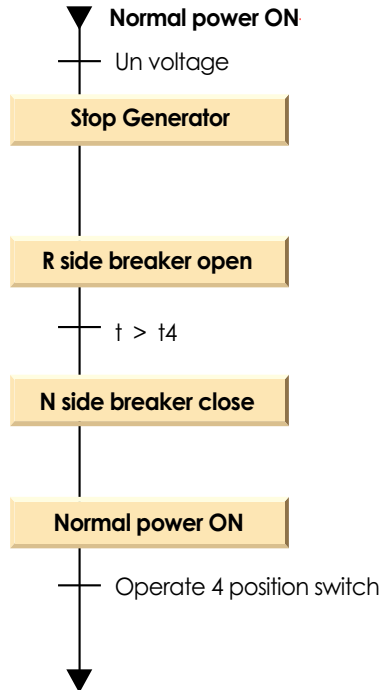
# ATS with ACBs

## A flow chart of operation

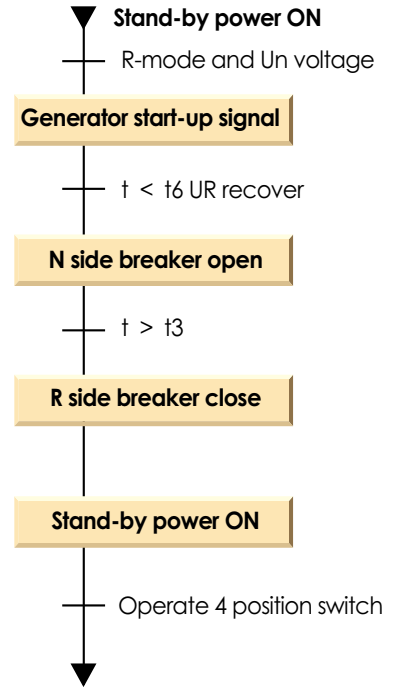
### STOP mode



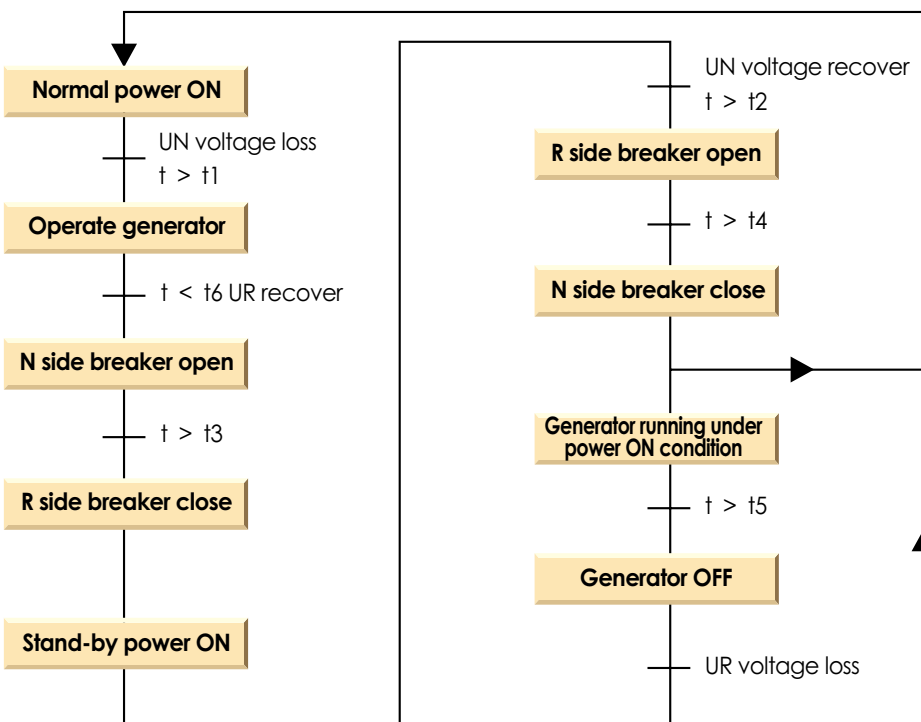
### N mode



### R mode

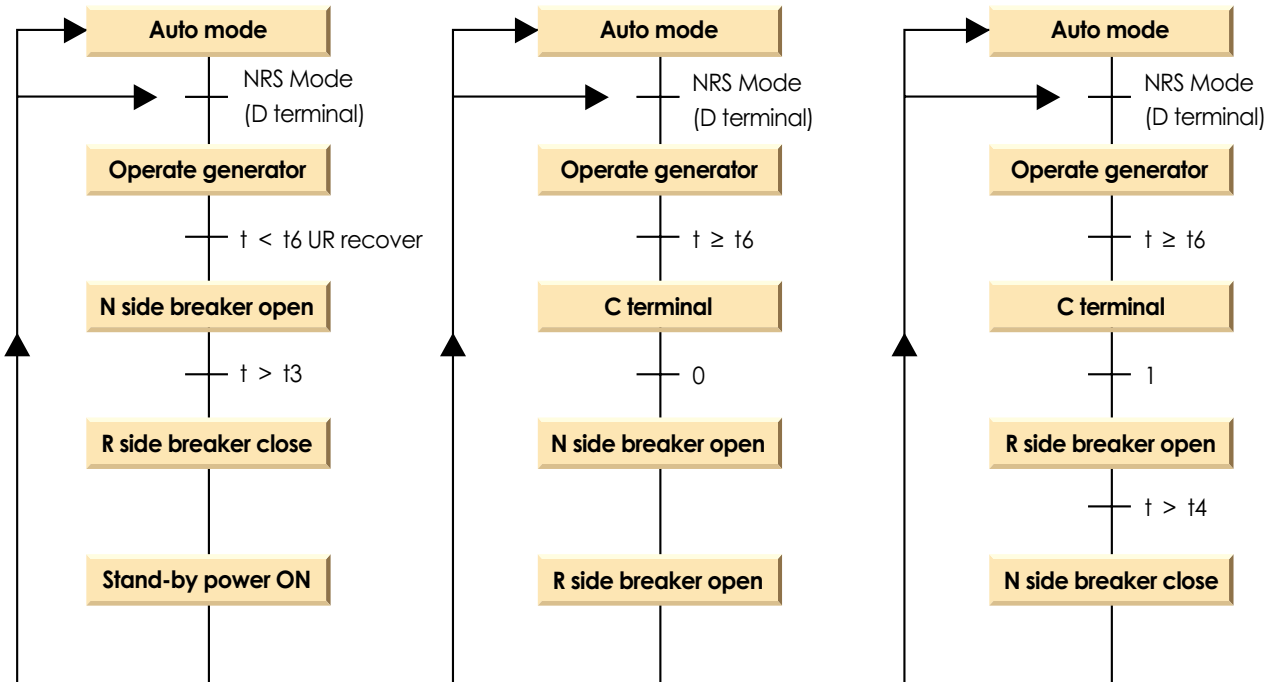


### AUTO mode

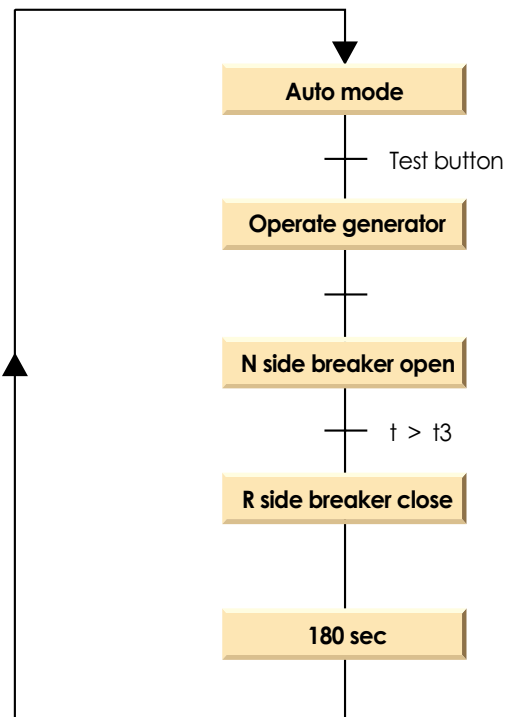


## A flow chart of operation

### NRS mode



### Test mode



Note) If you want to stop the test under test mode, press test button again