

5. OVERCURRENT RELEASE (OCR)

Options available for the type AR ACBs include a highly reliable, multi-functional overcurrent release (OCR) with a built-in 16-bit microprocessor.

This OCR is supplied with power through a CT and main circuit current signals from current sensors. When the OCR detects a fault, it sends a trip signal to the magnet hold trigger (MHT) or provides a trip indication or an alarm depending on the type of the fault.

The OCR uses the root mean square sensing for the long time delay (LTD), and N-phase protection (NP) functions. If a harmonic current flows through the ACB continuously, the root mean square sensing allows the ACB to operate normally.

The OCR is available in the type that follows:

- AGR-11BL L characteristic for general feeder (for works and transformer protection)

5-1. Specifications

Specifications of the OCR are shown in Table 19.

Table 19 Specifications of type AGR-11B OCR (●: Standard, ○: Optional, -: Not applicable)

Application		For general feeder		Reference section
Characteristic		L		
Type designation		AGR-11BL-AL	AGR-11BL-GL	
Protective function	Long time delay trip (LT)	●	●	5-2.
	Short time delay trip (ST)	●	●	
	Instantaneous trip (INST)	●	●	
	Ground fault trip (GF)	—	●	
	N-phase protection	○	○	
Protection characteristic	I ² t ON/OFF (ST)	●	●	
	I ² t ON/OFF (GF)	—	●	
Trip indication	Group indication LED and contact output	●	●	5-4.
Test function		—	—	—
Control power supply		Not required	Not required	3-3.

5-2. Characteristics

5-2-1. L characteristic for general feeder

A general view, characteristic settings, and characteristic curves of the type AGR-11BL OCR (with L characteristic) are shown in Fig. 29, Table 20, and Fig. 30 respectively.

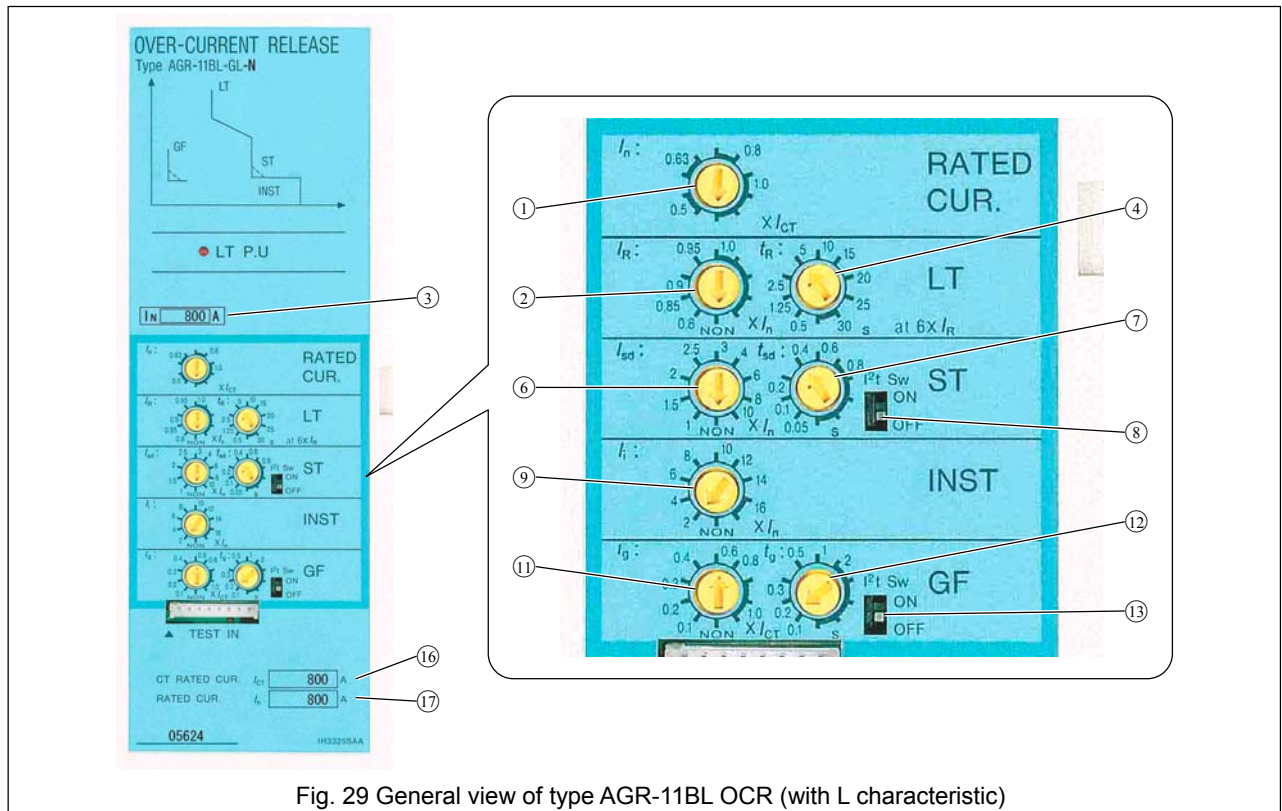


Fig. 29 General view of type AGR-11BL OCR (with L characteristic)

Table 20 Settings of type AGR-11L OCR (with L characteristic)

No.	Setting item	Symbol	Setting range						
			CT rated primary current $[I_{CT}] \times (0.5-0.63-0.8-1.0)$ (A)						
①	Rated current*1	I_n	Applied $[I_{CT}]$ (A)		5000		6300		
			Rated current	$[I_{CT}] \times 0.5$	2500	3200			
			$[I_n]$	$[I_{CT}] \times 0.63$	3200	4000			
			(A)	$[I_{CT}] \times 0.8$	4000	5000			
				$[I_{CT}] \times 1.0$	5000	6300			
②	Long time delay trip pickup current (continuous)	I_R	$[I_n] \times (0.8-0.85-0.9-0.95-1.0\text{-NON})$ (A) • Non tripping at not more than $[I_n] \times 1.05$. Tripping at more than $[I_n] \times 1.05$ and not more than $[I_n] \times 1.2$						
③	N-phase protection trip pickup current (continuous)	I_N	$[I_{CT}] \times (0.4-0.5-0.63-0.8-1.0)$: Fixed to a single point • Non tripping at not more than $[I_n] \times 1.05$. Tripping at more than $[I_n] \times 1.05$ and not more than $[I_n] \times 1.2$						
④	Long time delay/N-phase protection trip timing	t_R	Long time delay: (0.5-1.25-2.5-5-10-15-20-25-30) (sec) at 600% of $[I_R]$. Tolerance: $\pm 15\%$, +0.15s -0s N-phase protection: (0.5-1.25-2.5-5-10-15-20-25-30) (sec) at 600% of $[I_N]$. Tolerance: $\pm 15\%$, +0.15s -0s						
⑥	Short time delay trip pickup current	I_{sd}	$[I_n] \times (1-1.5-2-2.5-3-4-6-8-10\text{-NON})$ (A), Tolerance: $\pm 15\%$						
⑦	Short time delay trip timing	t_{sd}	Relaying time (ms.)	50	100	200	400	600	800
			Resettable time (ms.)	25	75	175	375	575	775
			Max. total clearing time (ms.)	120	170	270	470	670	870
⑧	Short time delay trip I^2t mode	$I^2t t_{sd}$	ON/OFF						
⑨	Instantaneous trip pickup current	I_i	$[I_n] \times (2-4-6-8-10-12-14-16\text{-NON})$ (A), Tolerance: $\pm 20\%$						
⑪	Ground fault trip pickup current *2	I_g	$[I_{CT}] \times (0.1-0.2-0.3-0.4-0.6-0.8-1.0\text{-NON})$ (A), Tolerance: $\pm 20\%$						
			t_g	Relaying time (ms.)	100	200	300	500	1000
⑫	Ground fault trip timing	t_g	Resettable time (ms.)	75	175	275	475	975	1975
			Max. total clearing time (ms.)	170	270	370	570	1070	2070
			$I^2t t_g$	ON/OFF					
⑬	Ground fault trip I^2t mode	$I^2t t_g$	ON/OFF						
⑯	CT rated primary current display-only field								
⑰	Factory-set rated current display-only field								

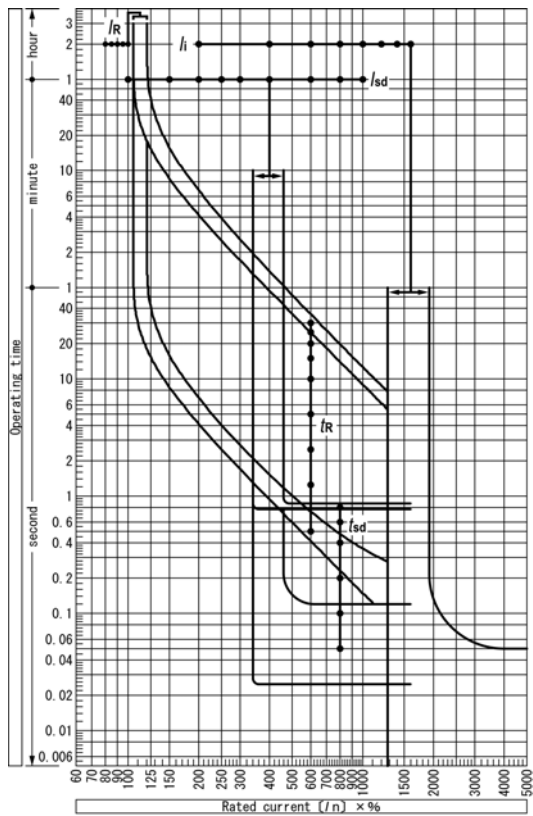
• Underlined values are default settings.

• NON setting disables protective functions. If the short time delay trip function and the instantaneous trip function are set to NON, however, the fail-safe operates so that:
• The instantaneous trip function is activated at $[I_n] \times 16$ or more if the short time delay trip function and the instantaneous trip function are set to NON.

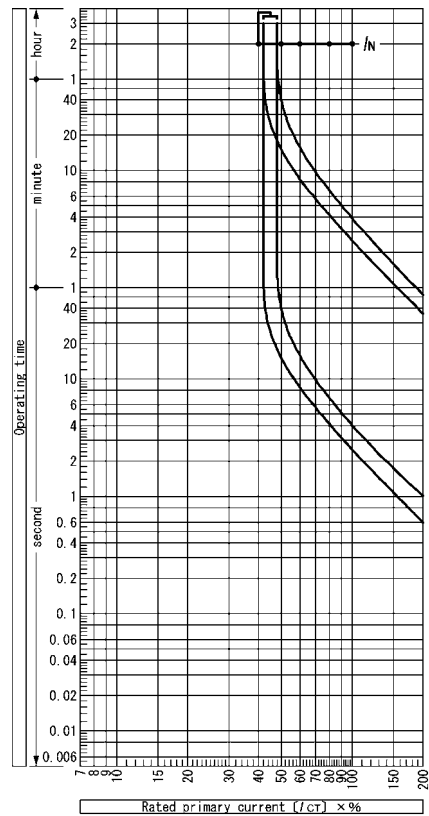
• A pickup current means the threshold by which the OCR determines whether or not an overcurrent occurs. When the current flowing through the OCR exceeds the pickup current setting provided that $[I_n] \times 1.05 < \text{pickup current setting} \leq [I_n] \times 1.2$, the OCR starts counting the time for tripping. Once the current flowing through the OCR reduces to less than the pickup current setting, time count is reset.

*1: A change in rated current setting results in changes in long time delay, short time delay, and instantaneous current settings accordingly.

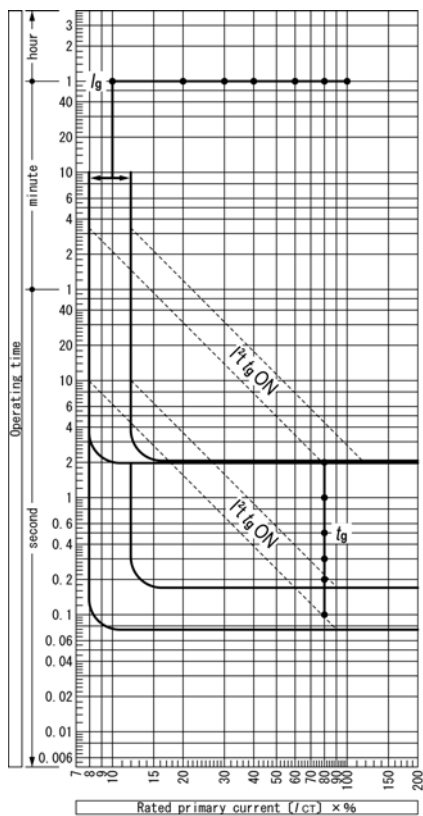
*2: The ground fault trip pickup current setting should not exceed 1200A.



Long time delay trip, Short time delay trip and Instantaneous trip



N-phase protection trip



Ground fault trip

Fig. 30 Characteristic curves of type AGR-11BL OCR (with L characteristic)

Note 1: The operating time (t) at a long time delay (or N-phase protection) trip pickup current setting is given by

$$t = -27.94 \times t_R \times \log_e \{ 1 - (1.125/r/i)^2 \} \pm 15\% + 0.15 - 0 \text{ [sec]}$$

r = Long time delay (or N-phase protection) trip pickup current setting,
 i = Overcurrent, t_R = Time setting

Note 2: The short time delay trip function has precedence over the long time delay trip function. The OCR operates at the short time delay trip timing even in those current ranges in which the long time delay trip time setting is shorter than the short time delay time setting.

5-3. OCR Setting Procedure

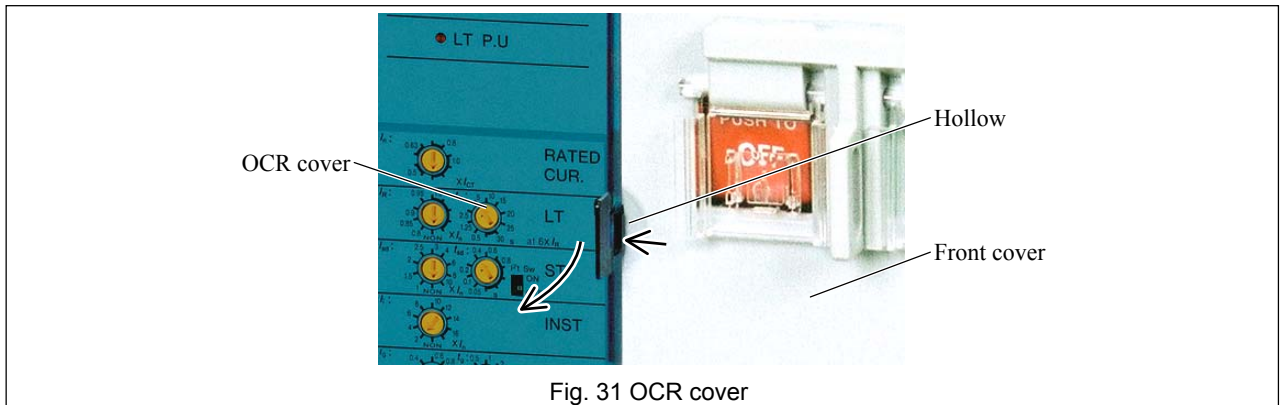
⚠ CAUTION

- OCR setting changes must be performed by competent persons.
- After setting changes are made, the settings be checked with e.g., a type ANU-1 OCR checker (optional).
- After completion of OCR tests, be sure to return the settings to the original values. Failure to do so may cause a fire or burnout.
- Before changing OCR settings, open the ACB and then lock the OFF button to prevent the ACB from being closed inadvertently.
- Use a small flatblade screwdriver with a torque of not more than 0.1 N·m or a force of not more than 0.1 N when adjusting the setting switches (rotary step switches or slide switches). An excessive torque or force may cause a malfunction.

The following describes how to set the OCR.

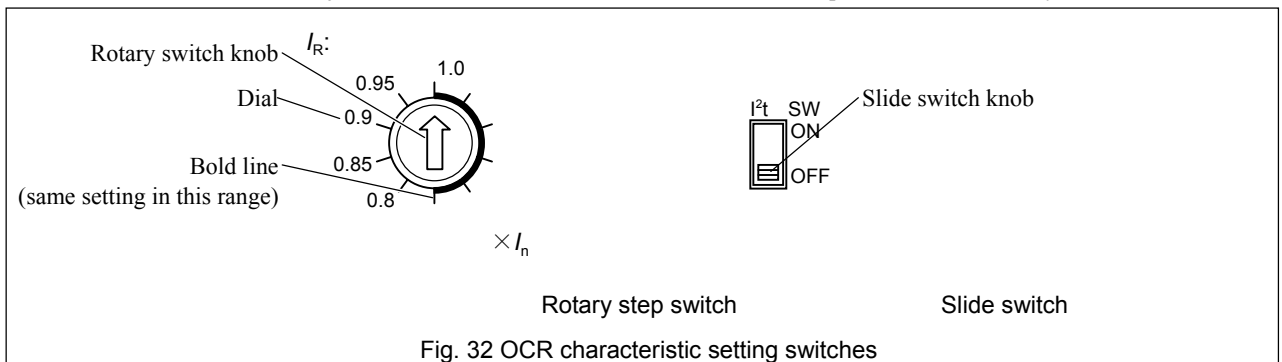
- 1) Open the ACB.
- 2) Push the right end of the OCR cover to the left at the hollow on the front cover to unlatch and open the OCR cover. See Fig. 31.

If the OCR cover is padlocked, first remove the padlock.



- 3) Use rotary step switches and slide switches to set the OCR. See Fig. 32.

- Rotary step switches must be adjusted with a small flatblade screwdriver. Turn switch knobs stepwise and do not stop the knobs halfway between calibration markings. A bold line on a switch dial means the same settings.
- Slide switches must also be adjusted with a small flatblade screwdriver. Do not stop switch knobs halfway.



- 4) Close the OCR cover.
- 5) After setting changes are made, it is recommended that the settings be checked with e.g., a type ANU-1 OCR checker (optional).

5-4. Operation Indication

The OCR has LEDs on the front panel to provide operation indications as shown in Fig. 33 and Table 21. It also outputs operation signals to contacts.

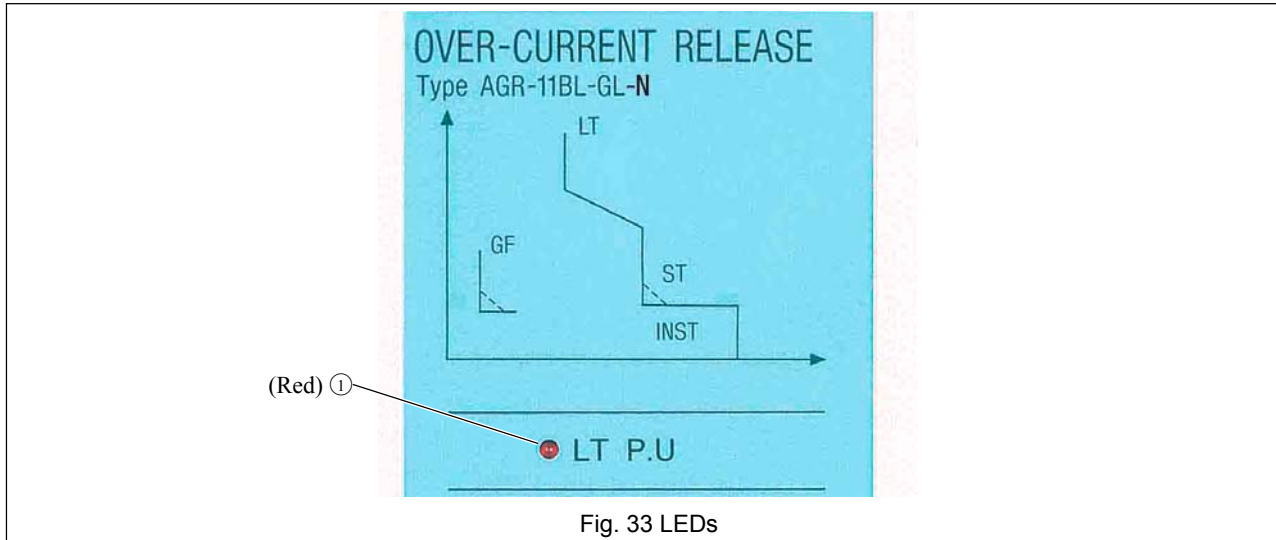


Fig. 33 LEDs

Table 21 Operation indication

Type of OCR	Control power supply	Operation	LED			Terminal No. See Fig. 12	Contact output		
			Position	State			Normal	Trip/Alarm	
				Normal	State pickup				Trip/Alarm
AGR-11BL-AL AGR-11BL-GL	Not required	Long time delay trip (LT) N-phase protection (NP) Short time delay trip (ST) Ground fault trip (GF) Instantaneous trip (INST)	①	OFF	Flash	OFF	⑩, ⑪	OFF	Turn OFF automatically after ON for 40 ms or more *1

*1: A self-hold circuit is required.