

# HR1S-AK Safety Relay Modules

## Four transistor outputs

- Removable terminal block (HR1S-AC5121P) allows for easy module replacement.
- Can be connected to light curtain.
- Fault diagnosis function with dual safety circuits.
- Internal relay operations can be monitored with LED indicator.
- Finger-safe protection
- 35-mm-wide DIN rail mounting
- EN, IEC compliant.
- TÜV NORD approved.
- UL listed, CSA approved.

Part No.	Voltage	Terminal Style
HR1S-AK311144	24V AC, -15 to +10%, 50/60 Hz	Integrated Terminal Block
HR1S-AK351144		
HR1S-AK311144P	24V DC, -15 to +10%	Removable Terminal Block
HR1S-AK351144P		

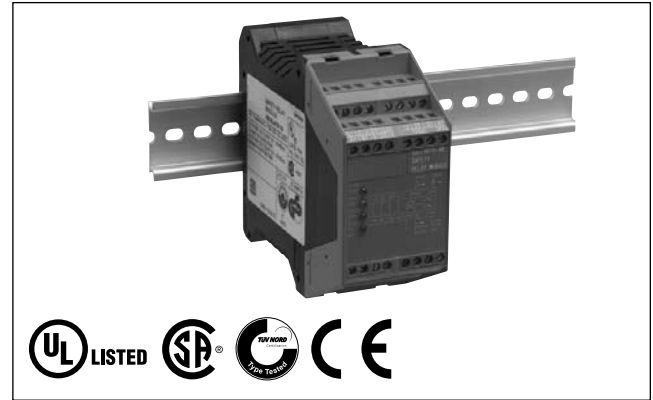
## Specifications

Operating Temperature	-10 to 55°C (no freezing)		
Degree of Protection	Terminal: IP20, Housing: IP40		
Rated Voltage	HR1S-AK311144(P): 24V AC (-15 to +10%) 50/60 Hz 24V DC (-15 to +10%) HR1S-AK351144(P): 120V AC (-15 to +10%) 50/60 Hz 24V DC (-15 to +10%)		
Power Consumption	120V AC: 6 VA maximum 24V AC: 5 VA maximum 24V DC: 3W maximum		
Overcurrent Protection	Electronic		
Control Circuit Voltage	24V		
Applicable Performance Level (PL)	e (EN ISO 13849-1)		
Safety Category	4 (EN ISO 13849-1)		
Safety Integrity Level (SIL)	3 (EN 62061)		
Response Time	40 ms maximum		
Input Synchronization Time	S1 → S2: 2 sec S2 → S1: 4 sec Automatic start: unlimited		
Overvoltage Category	III		
Pollution Degree	2		
Rated Insulation Voltage	300V		
Maximum Input Resistance	28Ω		
No. of Output Circuits	Safety Circuit	3NO	
	Time-delay Circuit	—	
Output Contact Ratings	Auxiliary Contacts	Contact	1NC
		Transistor	4NO
	Safety Circuit	AC-15	C300 Ue = 230V AC / Ie = 0.75A
		DC-13	24V/1.5A, 24V DC / Ie = 1.5A
	Time-delay Circuit	AC-15	—
		DC-13	—
Auxiliary Circuits	AC-15	C300 Ue = 230V AC / Ie = 0.75A	
	DC-13	24V/1.5A, 24V DC / Ie = 1.5A	
Transistor Circuit	24V/20 mA		
Minimum Applicable Load	17V/10 mA (initial value)		
Operating Frequency	1200 operations/h maximum		
Mechanical Durability	10,000,000 operations minimum		
Rated Current	Safety circuit output total: 18A maximum Each safety circuit output: 6A maximum		
Wire Size	HR1S-AK311144: 1 × 2.5 mm <sup>2</sup> , 2 × 0.75 mm <sup>2</sup> maximum HR1S-AK311144P: 1 × 2.5 mm <sup>2</sup> , 2 × 1.5 mm <sup>2</sup> maximum HR1S-AK351144: 1 × 2.5 mm <sup>2</sup> , 2 × 0.75 mm <sup>2</sup> maximum HR1S-AK351144P: 1 × 2.5 mm <sup>2</sup> , 2 × 1.5 mm <sup>2</sup> maximum		
Weight (approx.)	HR1S-AK311144(P): 300g HR1S-AK351144(P): 400g		

- Use a 4A fuse (Type gL) or a 6A fast blow fuse for power line and output line protection.

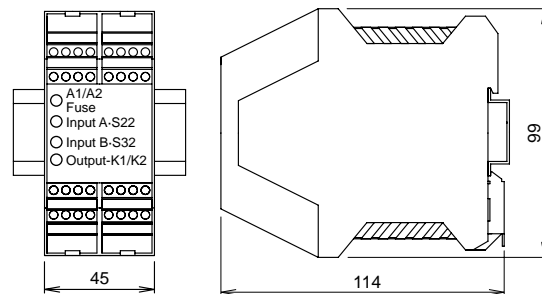
## LED Indicator

- A1/A2 Fuse:  
Turns on when power voltage is normal.  
Turns off when power is interrupted or the electronic fuse blows.
- Input A-S22: Turns on when S21-S22 is closed.
- Input B-S32: Turns on when S31-S32 is closed.
- Output K1/K2: Turns on when the safety outputs of 13-14, 23-24, and 33-34 are closed.

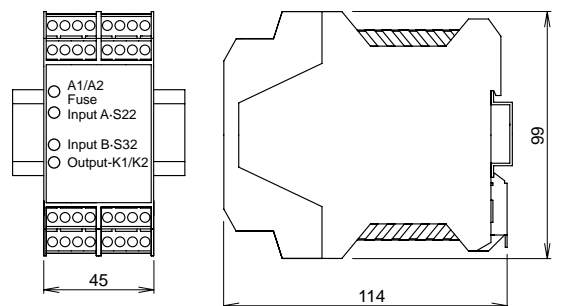


## Dimensions

### HR1S-AK311144/-AK351144

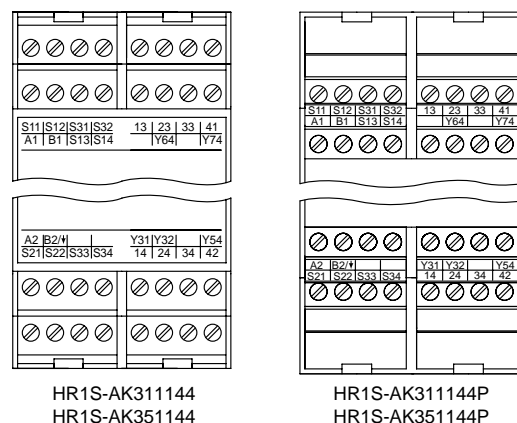


### HR1S-AK311144P/-AK351144P Removable Terminal

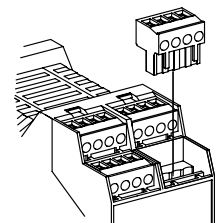


All dimensions in mm.

## Terminal Arrangement



- The terminal blocks of the HR1S-AK311144P/-AK351144P can be removed and installed as shown below, allowing for easy installation and replacement of modules.

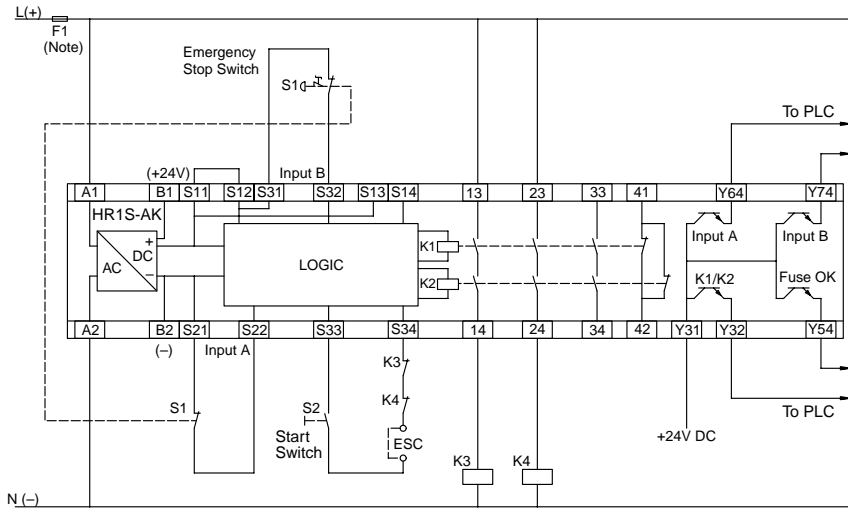


# HR1S-AK Safety Relay Modules

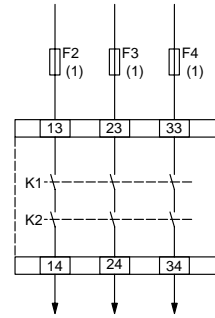
## Wiring Diagram

Note: Be sure to connect terminals to correct power supply.  
 AC power: A1-A2  
 DC power: B1-B2

### Safety Category 4 Circuit (using an emergency stop switch)



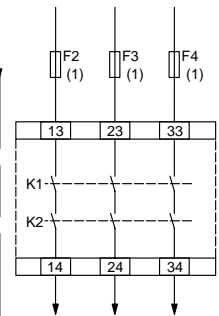
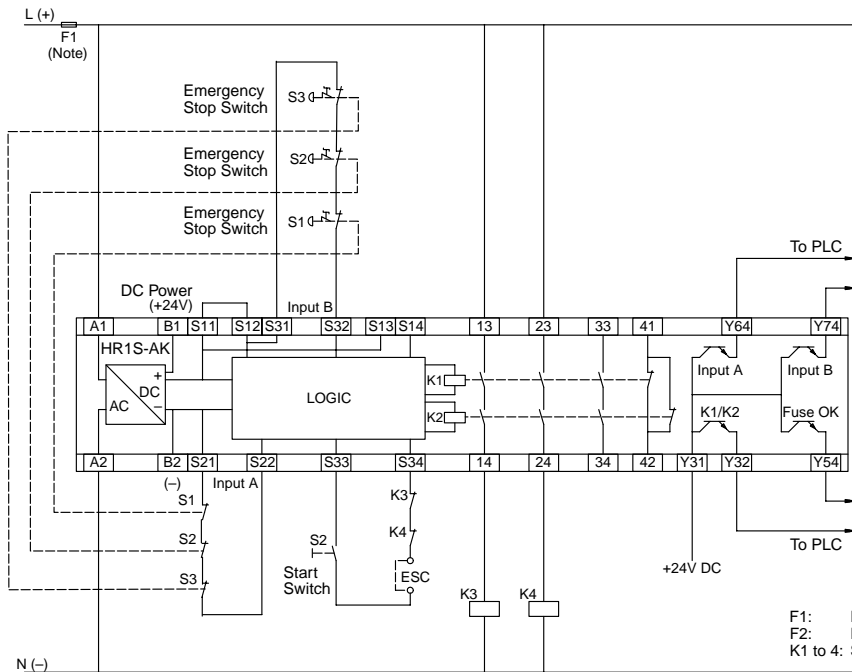
Safety category is achieved by an entire control system. Take the connected safety equipment and wiring into consideration.



Note: Use a 4A fuse (Type gL) or a 6A fast blow fuse for power and output line protection.

F1: Protection fuse for the power of safety relay module  
 F2: Protection fuse for the output of safety relay module  
 K1 to 4: Safety contactor

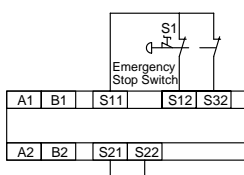
### Safety Category 3 Circuit (using multiple emergency stop switches)



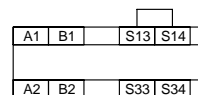
Note: Use a 4A fuse (Type gL) or a 6A fast blow fuse for power and output line protection.

F1: Protection fuse for the power of safety relay module  
 F2: Protection fuse for the output of safety relay module  
 K1 to 4: Safety contactor

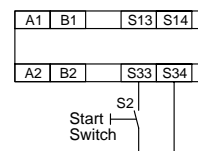
Although two input channels are used, short-circuit cannot be detected in the wiring shown below. Safety category becomes 3.



### When not using a start switch (automatic start)



### When monitoring the start switch (detecting the OFF status of start switch)



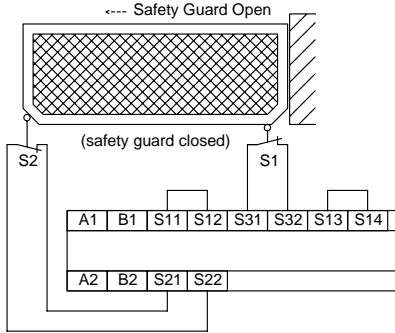
## Wiring Diagram with Safety Equipment

Applicable safety category depends on the function of connected safety equipment. Confirm the function of safety equipment before use.

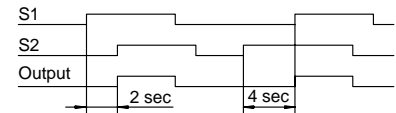
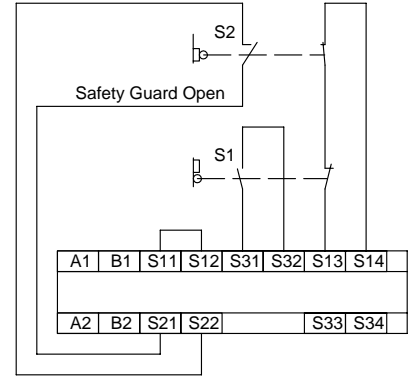
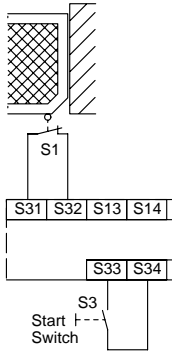
**Two limit switches with synchronization monitor (Synchronization monitor is effective for automatic start only.)**

### Two limit switches/without synchronization monitor

#### Automatic Start

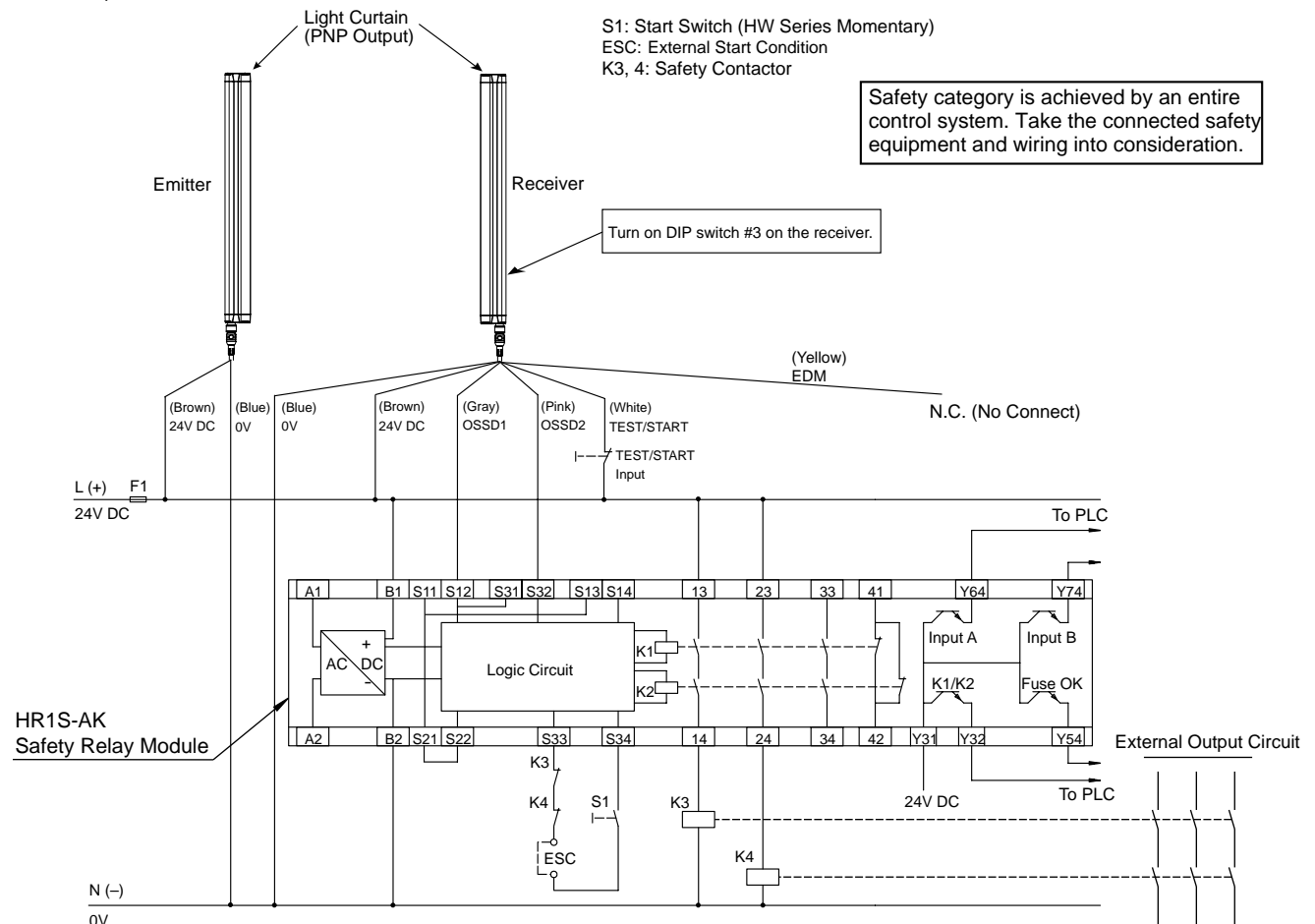


#### Using a Start Switch



### When connecting with a light curtain

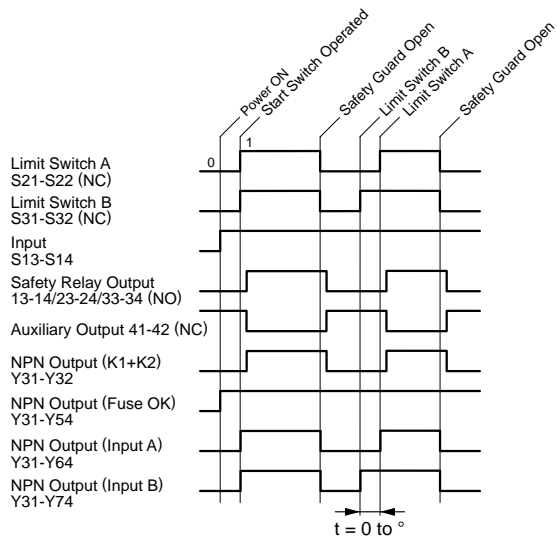
Note: Note the terminals with different input voltages when wiring.  
 AC power: Connect to A1-A2.  
 DC power: Connect to B1-B2.



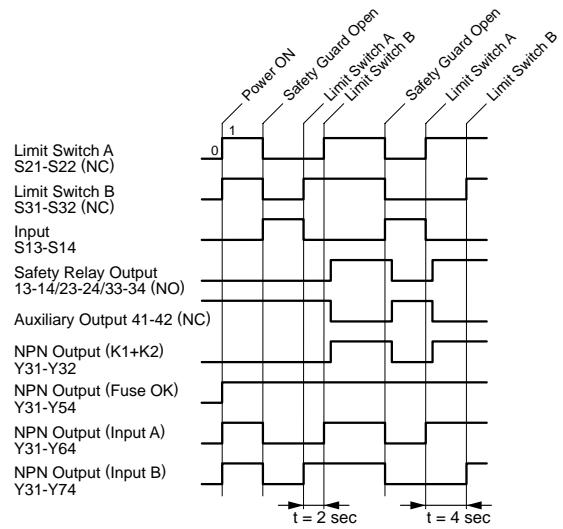
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## Operation Chart

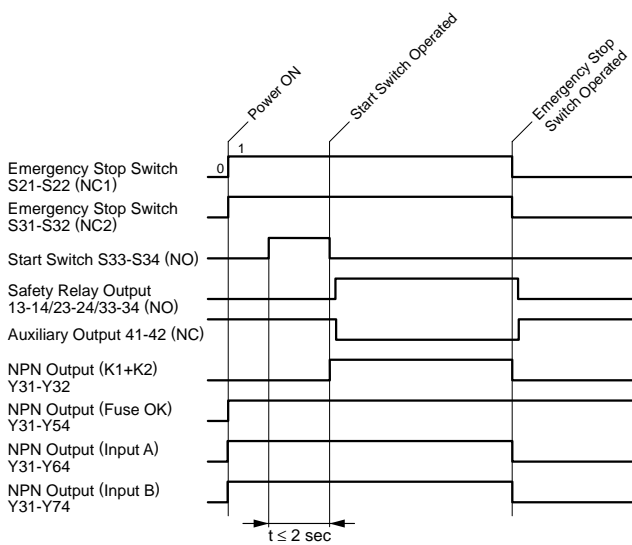
**Safety guard application using two limit switches (automatic start mode)**



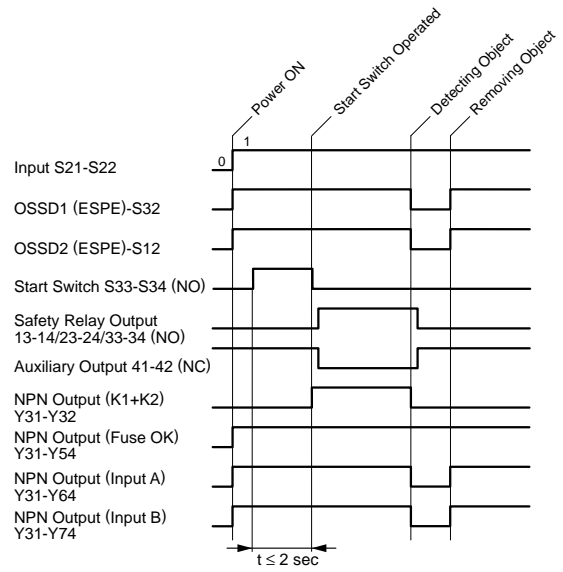
**Safety guard application using two limit switches (automatic start mode, synchronization monitor mode)**



**Using emergency stop switches (start switch monitor mode)**



**Using OSSD output of light curtain (ESPE)**



## Output Contact Electrical Life

