

HR1S-AC Safety Relay Modules

Transistor output provided.

- Removable terminal block (HR1S-AC5121P) allows for easy module replacement.
- 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-AC5121	24V AC, -20 to +10% 50/60 Hz	Integrated Terminal Block
HR1S-AC5121P	24V DC, ±20%	Removable Terminal Block

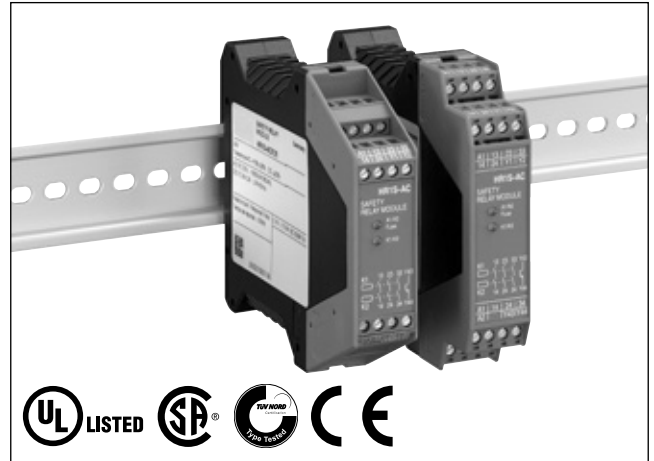
Specifications

Operating Temperature			-10 to +55°C (no freezing)
Degree of Protection			Terminal: IP20, Housing: IP40
Rated Voltage			24V AC (-20 to +10%) 50/60 Hz 24V DC (±20%)
Power Consumption			AC: 2.2 VA (24V AC) maximum DC: 1.2W (24V DC) maximum
Overcurrent Protection			Electronic
Control Circuit Voltage			24V
Applicable Performance Level (PL)			e (EN ISO 13849-1)
Safety Category			3 (EN 954-1)
Safety Integrity Level (SIL)			3 (EN 62061)
Response Time			100 ms maximum
Input Synchronization Time			Unlimited
Overvoltage Category			III
Pollution Degree			2
Rated Insulation Voltage			300V
No. of Outputs	Safety Circuit		3NO
	Time-delay Circuit		—
	Auxiliary Circuit	Contact	—
Transistor		1NO (transistor)	
Output Contact Ratings	Safety Circuit	AC-15	C300: $U_e = 230V\ AC / I_e = 0.75A$
		DC-13	$24V/2A: U_e = 24V\ DC / I_e = 2A$
	Time-delay Circuit	AC-15	—
		DC-13	—
	Auxiliary Circuit	AC-15	—
		DC-13	—
	Transistor Circuit		24V/20mA
	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: 10.5A maximum
Wire Size			HR1S-AC5121: 1 × 2.5mm ² , 2 × 0.75mm ² maximum HR1S-AC5121P: 1 × 2.5mm ² , 2 × 1.5mm ² maximum
Weight (approx.)			160g

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

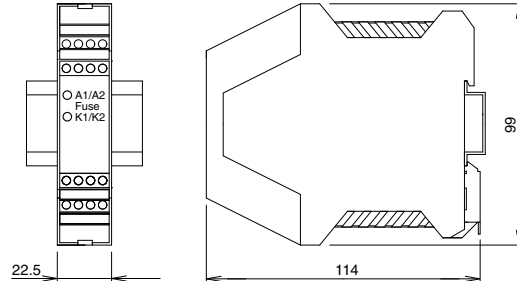
LED Indicator

- A1/A2 Fuse:
Turns on when power circuit is normal.
Turns off when power is interrupted or the electronic fuse blows.
- K1: Turns on when K1 relay operates.
- K2: Turns on when K2 relay operates.

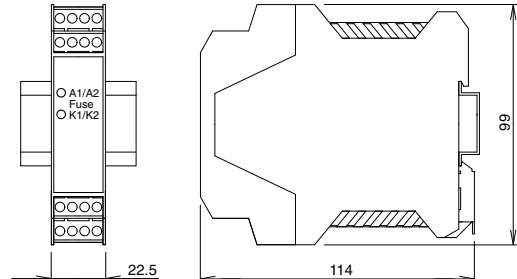


Dimensions

HR1S-AC5121

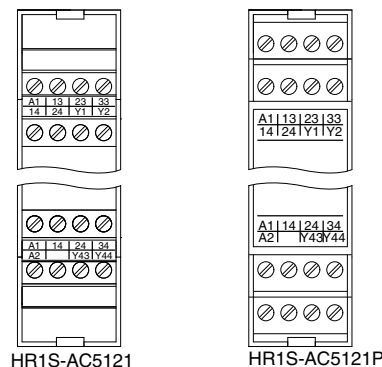


HR1S-AC5121P Removable Terminal

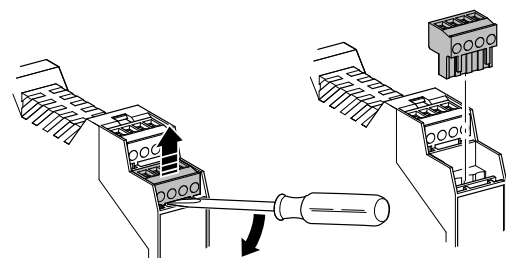


All dimensions in mm.

Terminal Arrangement



- The terminal block of the HR1S-AC5121P can be removed and installed as shown below, allowing for easy installation and replacement of modules.

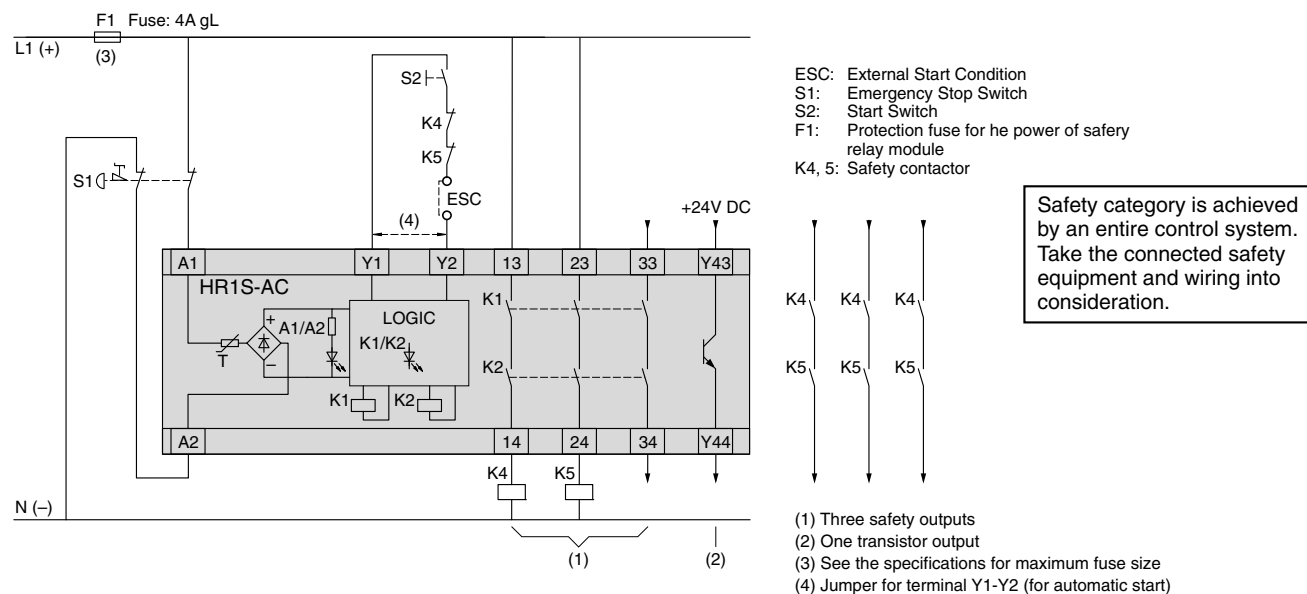


Flush Silhouette
Switches & Pilot Lights
Display Lights
LED Illumination Units
Display Units
Safety Products
Terminal Blocks
Comm. Terminals
AS-Interface
Relays & Timers
Sockets
Circuit Protectors
Power Supplies
PLCs & SmartRelay
Operator Interfaces
Sensors
Control Stations
Explosion Protection
References

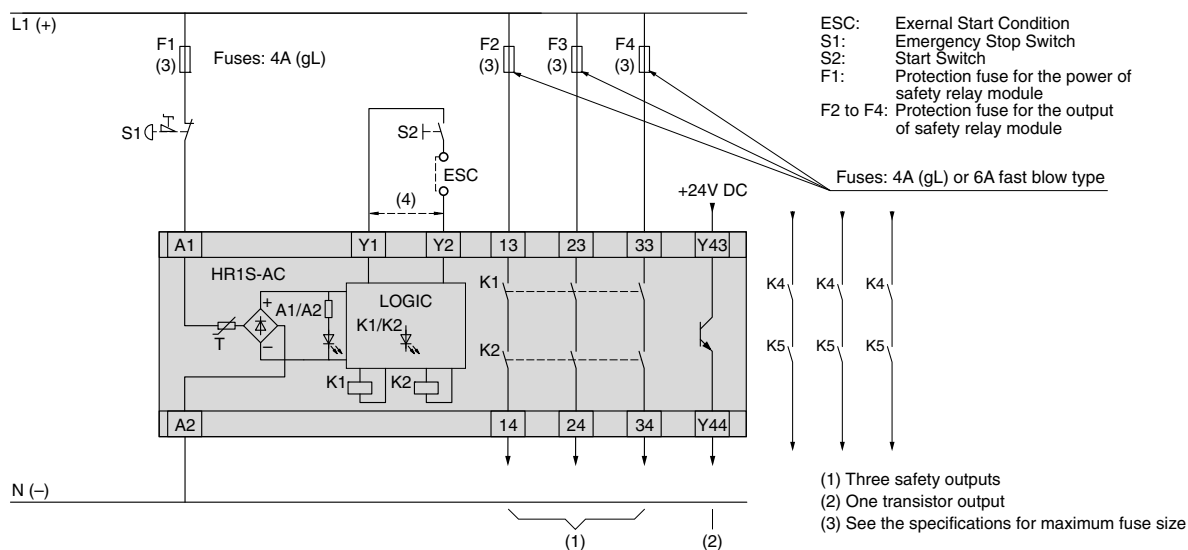
HR1S-AC Safety Relay Modules

Wiring Diagram

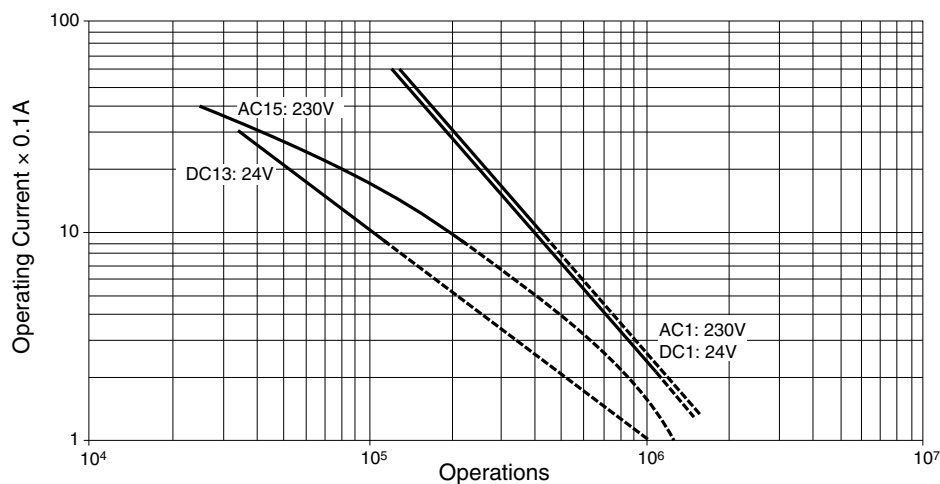
Safety Category 3 Circuit (using an emergency stop switch with 2NC contacts)



Safety Category 1 Circuit (using an emergency stop switch with 1NC contact)



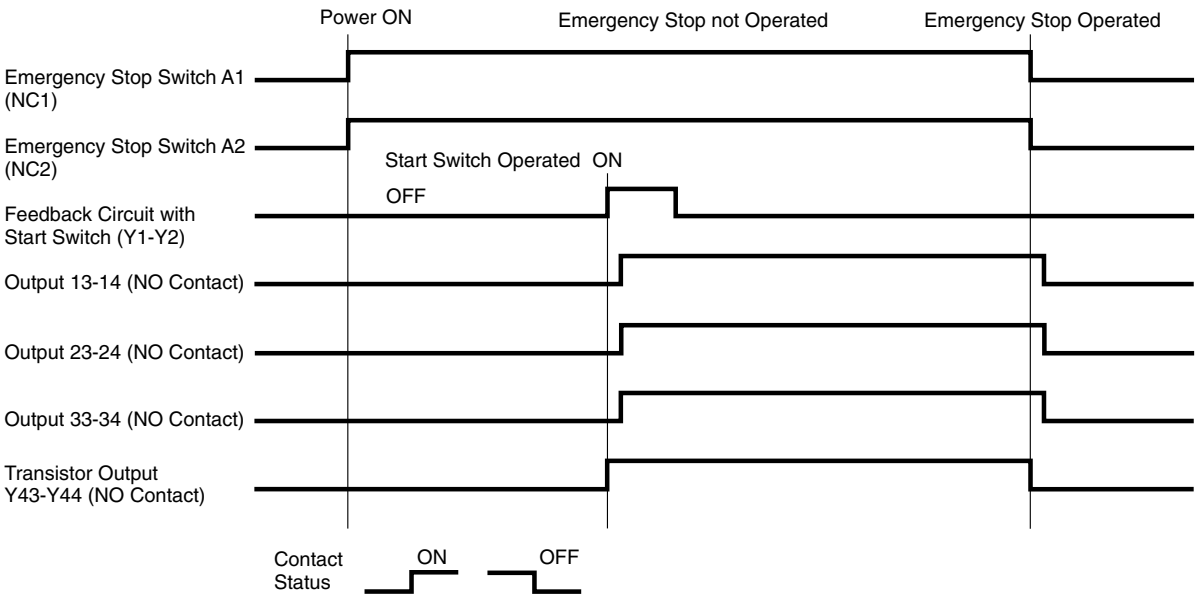
Output Contact Electrical Life



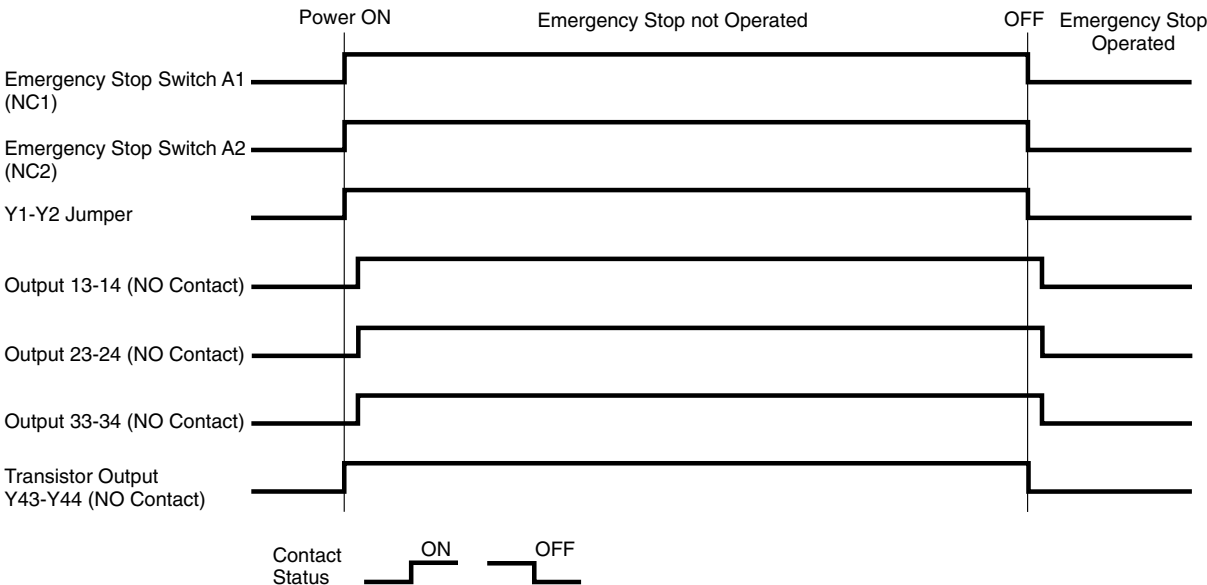
HR1S-AC Safety Relay Modules

Operation Chart

When Using a Start Switch



When not Using the Start Switch

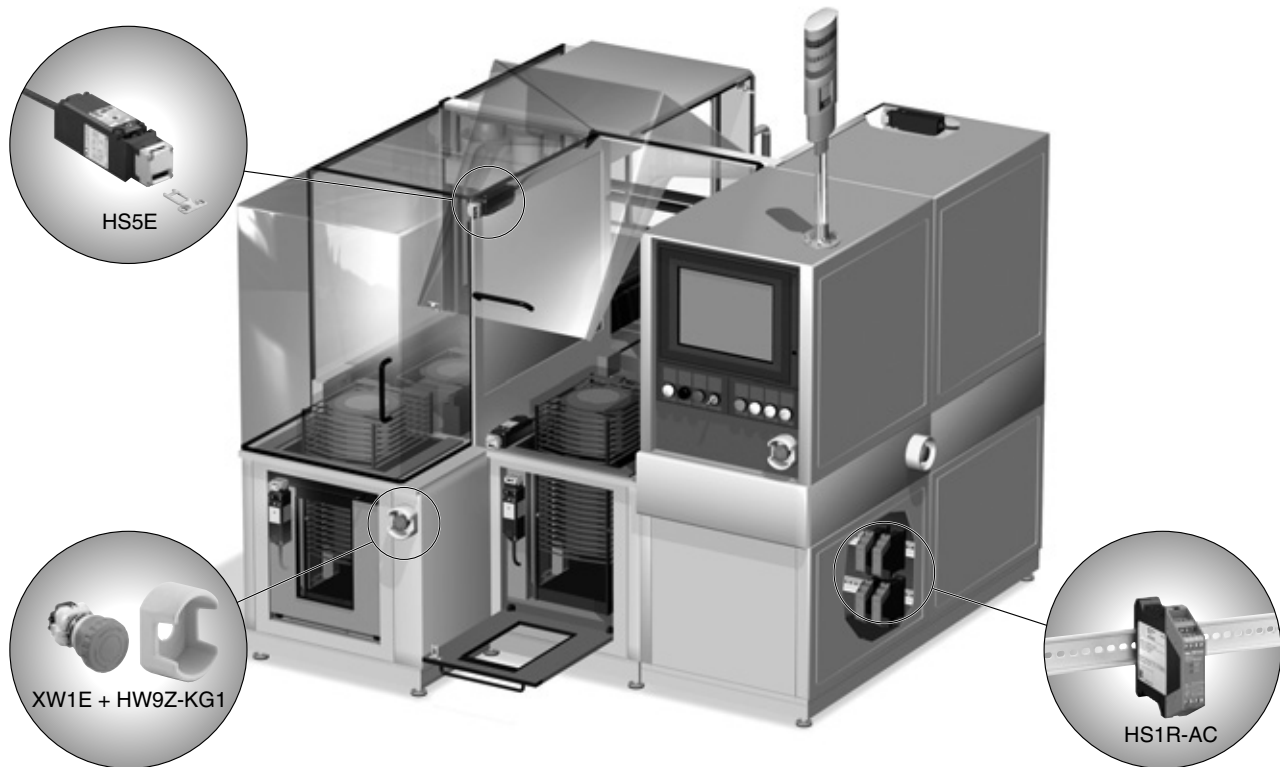


Flush Silhouette
Switches & Pilot Lights
Display Lights
LED Illumination Units
Display Units
Safety Products
Terminal Blocks
Comm. Terminals
AS-Interface
Relays & Timers
Sockets
Circuit Protectors
Power Supplies
PLCs & SmartRelay
Operator Interfaces
Sensors
Control Stations
Explosion Protection
References

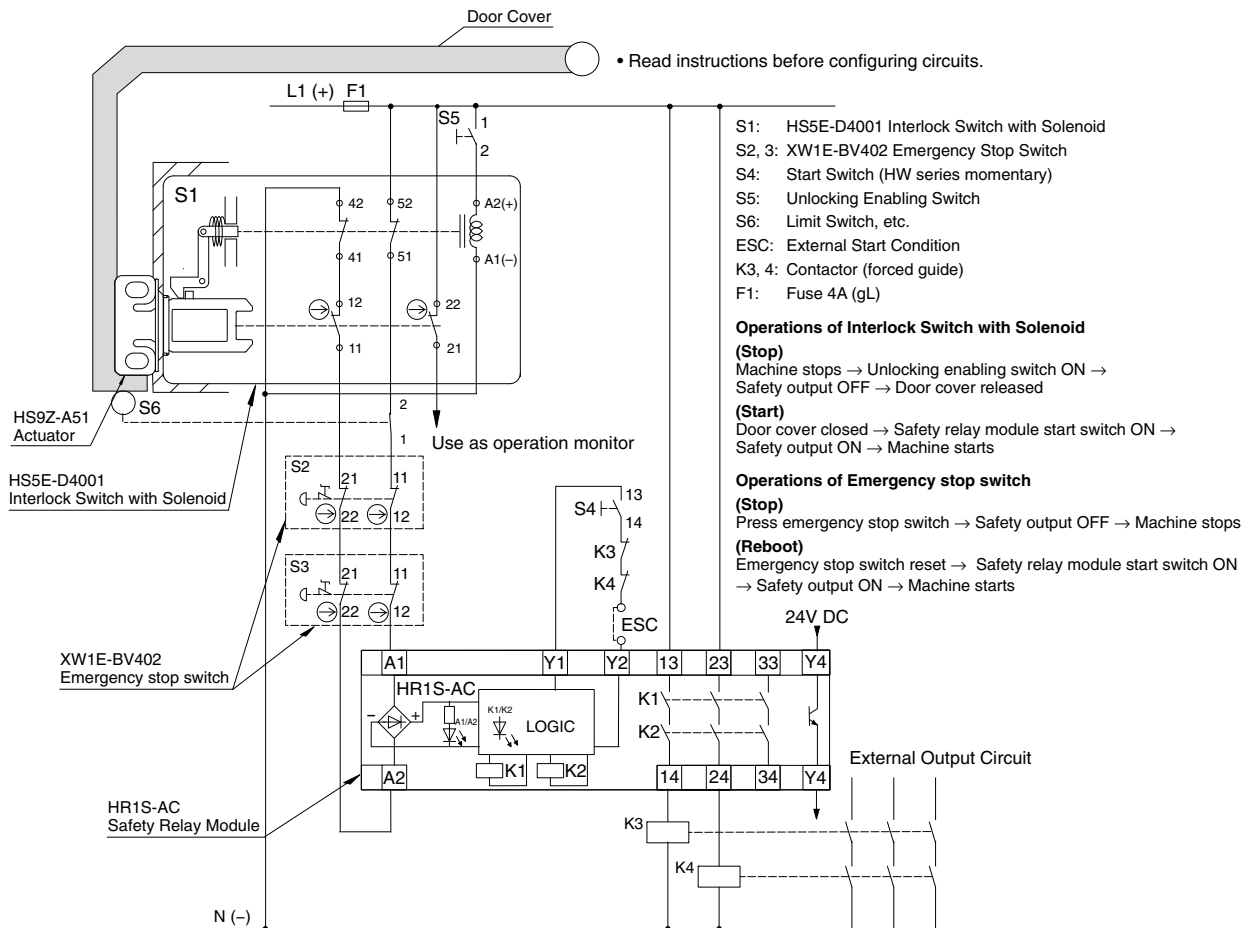
HR1S-AC Safety Relay Modules

Semiconductor Manufacturing Equipment Example

When using HR1S-AC (safety relay module) and HS5E (solenoid type interlock switch) + XW1E (emergency stop switch)



Circuit Example (Safety Category 3)



Note: Safety category is determined for the entire system. Take safety equipment and wiring into consideration.

HR1S-AF Safety Relay Modules

Small and high function (welding detection of start switch)

- Removable terminal block (HR1S-AC5121P) allows for easy module replacement.
- 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-AF5130B	24V AC, -15 to +10%, 50/60 Hz	Integrated Terminal Block
HR1S-AF5130PB	24V DC, -15 to +10%	Removable Terminal Block

Specifications

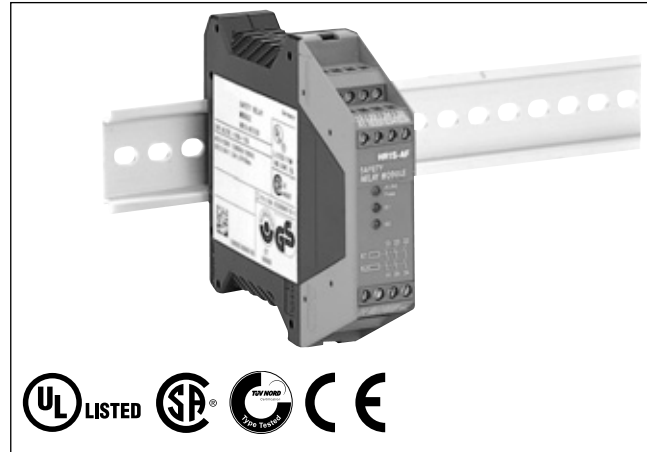
Operating Temperature			-25 to +55°C (no freezing)
Degree of Protection			Terminal: IP20, Housing: IP40
Rated Voltage			24V AC (-15 to +10%) 50/60 Hz 24V DC (-15 to +10%)
Power Consumption			5 VA maximum
Overcurrent Protection			Electronic (Note)
Control Circuit Voltage			24V
Applicable Performance Level (PL)			e (EN ISO 13849-1)
Safety Category			4 (EN ISO 13849-1)
Safety Integrity Level (SIL)			3 (EN 62061)
Response Time			When S11-S12, S21-S22 are interrupted: 20 ms maximum When power is interrupted: 60 ms maximum
Input Synchronization Time			Unlimited
Overvoltage Category			III
Pollution Degree			2
Rated Insulation Voltage			300V
Maximum Input Resistance			90Ω
No. of Outputs	Safety Circuit		3NO
	Time-delay Circuit		—
	Auxiliary Contact	Contact	—
		Transistor	—
Output Contact Ratings	Safety Circuit	AC-15	C300 Ue = 240V AC / Ie = 0.75A
		DC-13	24V/1.5A, Ue = 24V DC / Ie = 1.5A
	Time-delay Circuit	AC-15	—
		DC-13	—
	Auxiliary Circuit	AC-15	—
		DC-13	—
	Transistor Circuit		—
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-AF5130B: 1 × 2.5 mm ² , 2 × 0.75 mm ² maximum HR1S-AF5130PB: 1 × 2.5 mm ² , 2 × 1.5 mm ² maximum
Weight (approx.)			250g

Note: Short-circuit of S11 and S21 activates the overcurrent protection circuit, interrupting the power supply. The safety output turns off.
Normal status is restored when the short-circuit is removed.

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

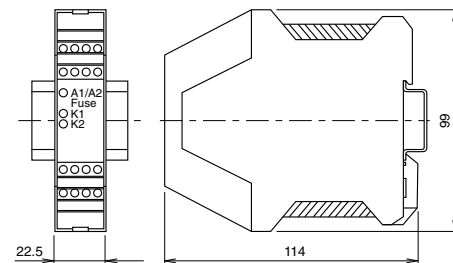
LED Indicators

- A1/A2 Fuse:
Turns on when power circuit is normal.
Turns off when power is interrupted or the electronic fuse blows.
- K1: Turns on when K1 relay operates.
- K2: Turns on when K2 relay operates.

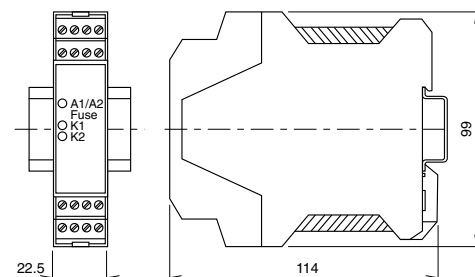


Dimensions

HR1S-AF5130B

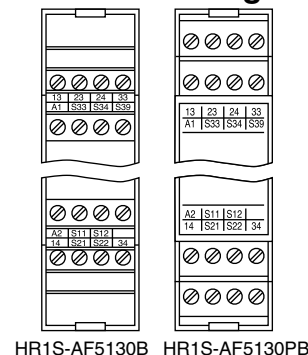


HR1S-AF5130PB Removable Terminal

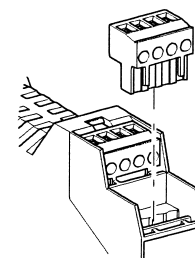


All dimensions in mm.

Terminal Arrangement



- The terminal block of the HR1S-AF5130PB can be removed and installed as shown below, allowing for easy installation and replacement of modules.

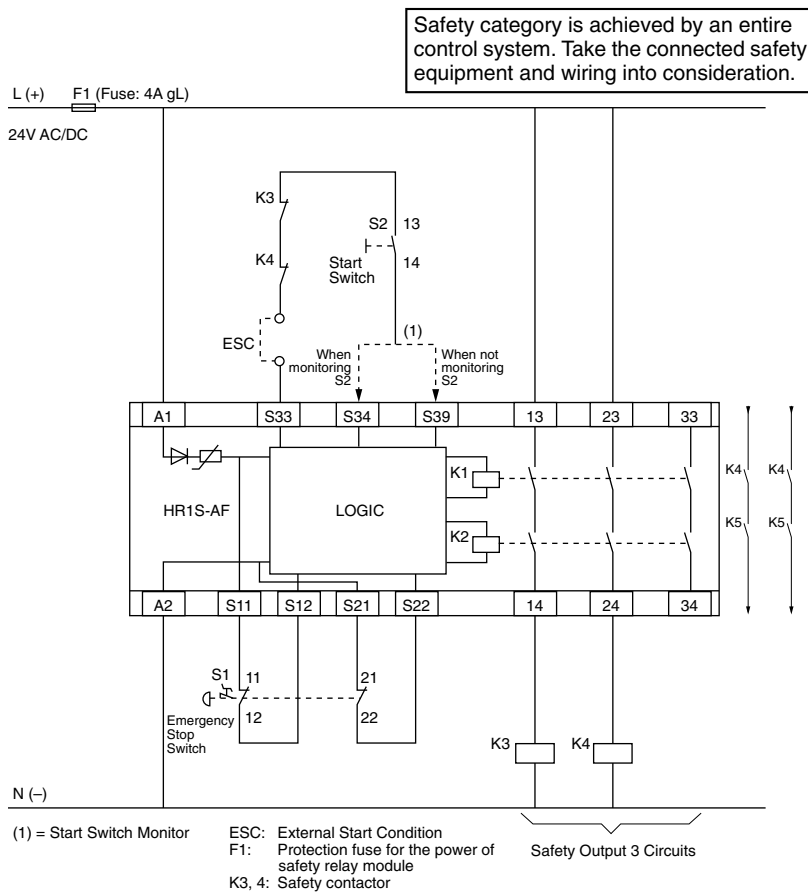


Flush Silhouette
Switches & Pilot Lights
Display Lights
LED Illumination Units
Display Units
Safety Products
Terminal Blocks
Comm. Terminals
AS-Interface
Relays & Timers
Sockets
Circuit Protectors
Power Supplies
PLCs & SmartRelay
Operator Interfaces
Sensors
Control Stations
Explosion Protection
References

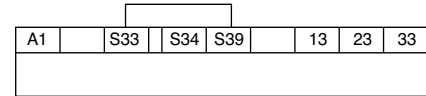
HR1S-AF Safety Relay Modules

Wiring Diagram

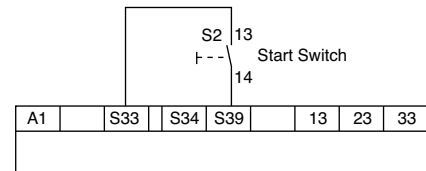
Safety Category 4 Circuit (using an emergency stop switch)



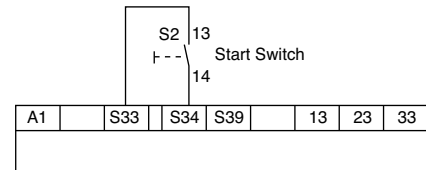
When not using a start switch (automatic start)



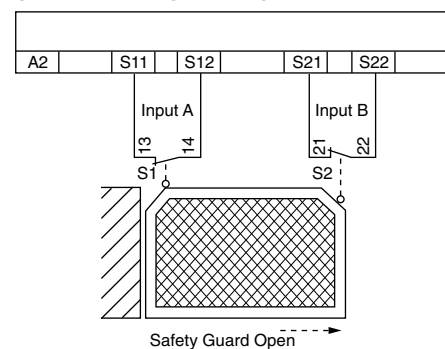
When not monitoring the start switch (welding of start switch cannot be detected)



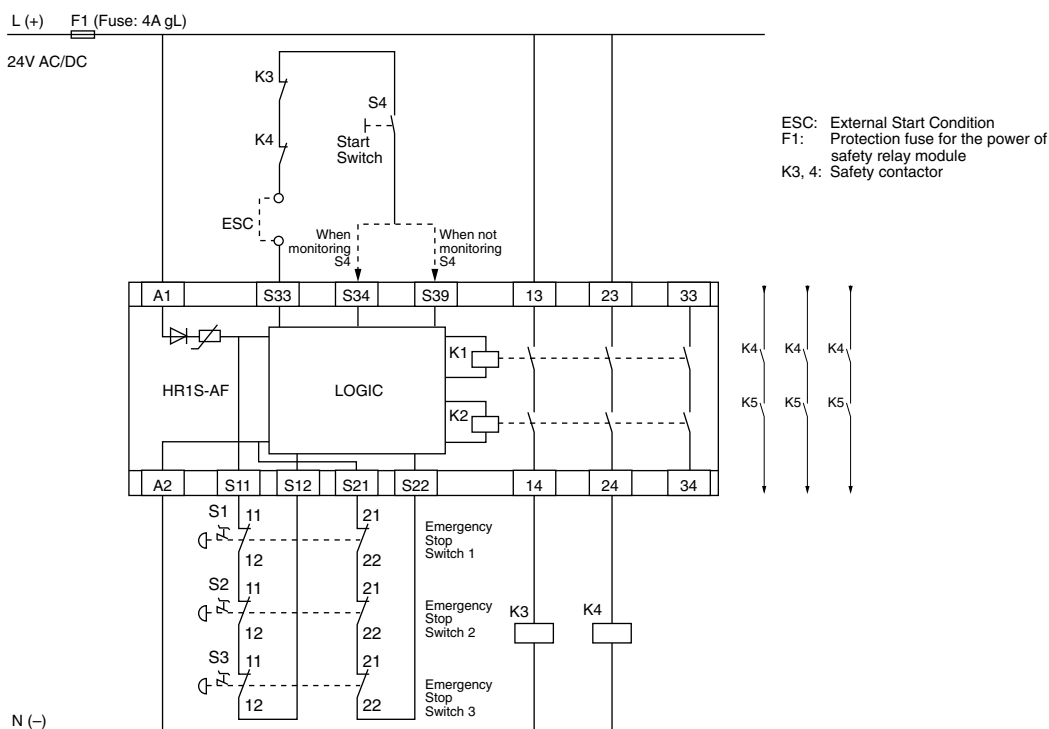
When monitoring the start switch (detecting the OFF status of start switch)



Limit switch or interlock switch for guard opening/closing



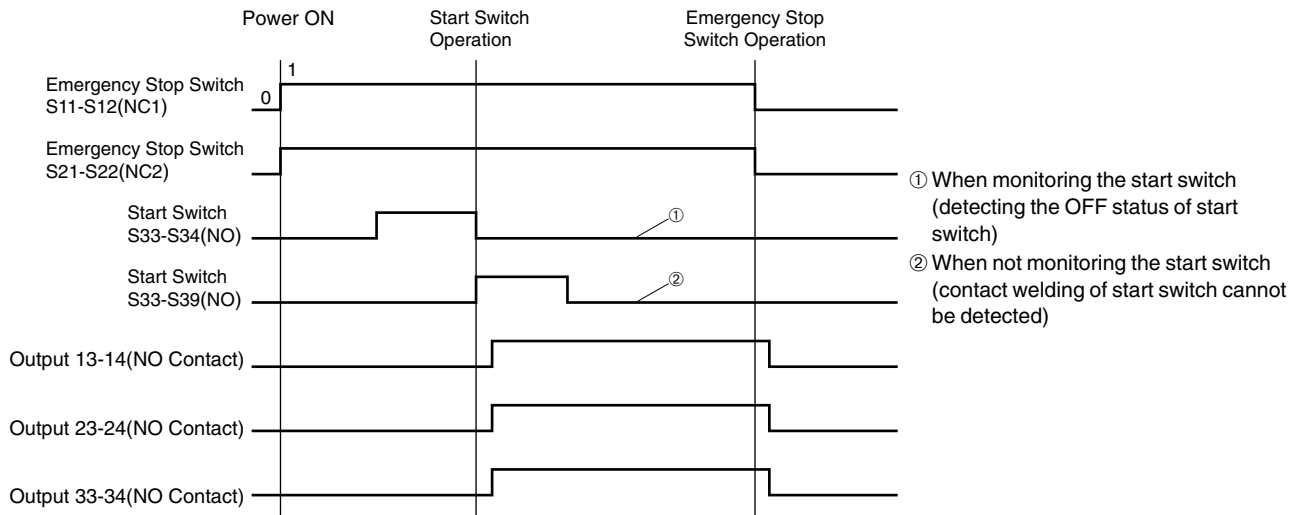
Safety Category 3 Circuit (using multiple emergency stop switches)



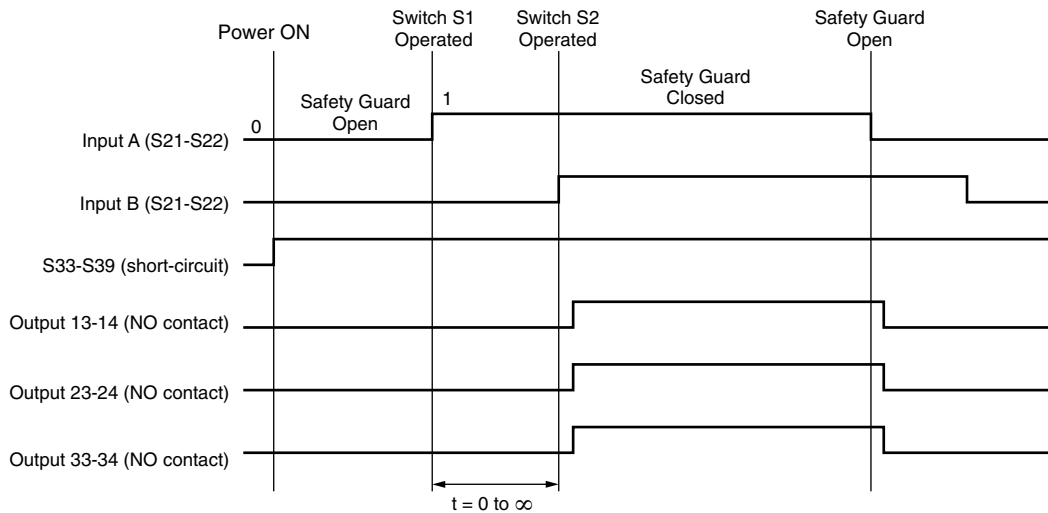
HR1S-AF Safety Relay Modules

Operation Chart

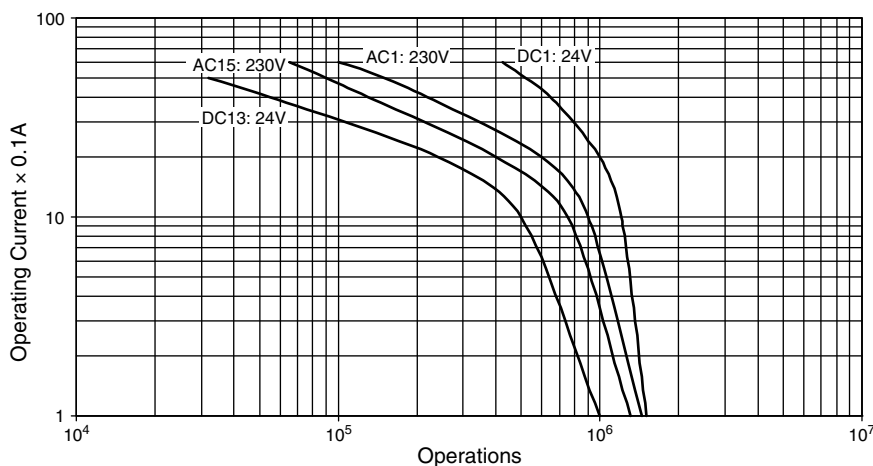
When Using the Emergency Stop Switch



When not Using the Safety Guard (Automatic Start)



Output Contact Electrical Life



Flush Silhouette
Switches & Pilot Lights
Display Lights
LED Illumination Units
Display Units
Safety Products
Terminal Blocks
Comm. Terminals
AS-Interface
Relays & Timers
Sockets
Circuit Protectors
Power Supplies
PLCs & SmartRelay
Operator Interfaces
Sensors
Control Stations
Explosion Protection
References

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		

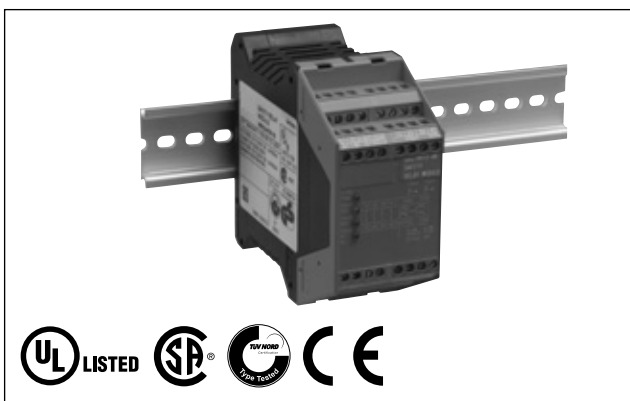
Specifications

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		—			
	Auxiliary Contacts	Contact Transistor	1NC 4NO			
Output Contact Ratings	Safety Circuit	AC-15 DC-13	C300 Ue = 230V AC / Ie = 0.75A 24V/1.5A, 24V DC / Ie = 1.5A			
	Time- delay Circuit	AC-15 DC-13	— —			
		Auxiliary Circuits	AC-15 DC-13	C300 Ue = 230V AC / Ie = 0.75A 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 ² , 2 × 0.75 mm ² maximum HR1S-AK311144P: 1 × 2.5 mm ² , 2 × 1.5 mm ² maximum HR1S-AK351144: 1 × 2.5 mm ² , 2 × 0.75 mm ² maximum HR1S-AK351144P: 1 × 2.5 mm ² , 2 × 1.5 mm ² 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.

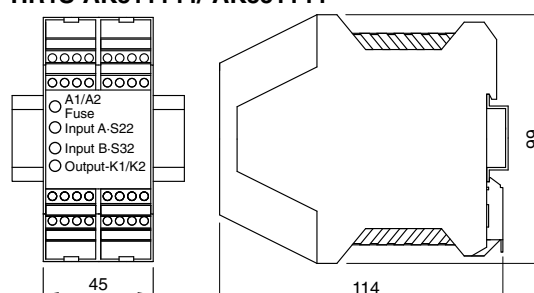
LED Indicator

- 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.

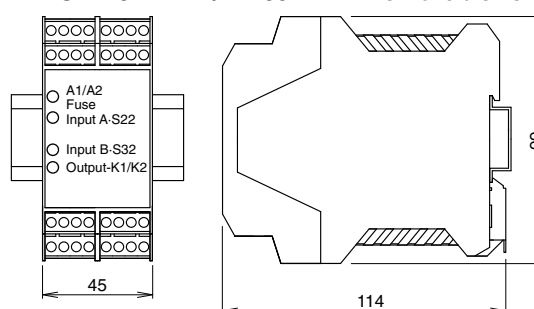


Dimensions

HR1S-AK311144/-AK351144

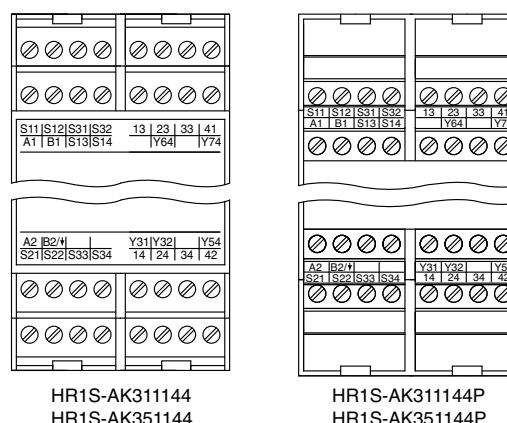


HR1S-AK311144P/-AK351144P Removable Terminal

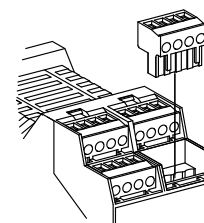


All dimensions in mm.

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

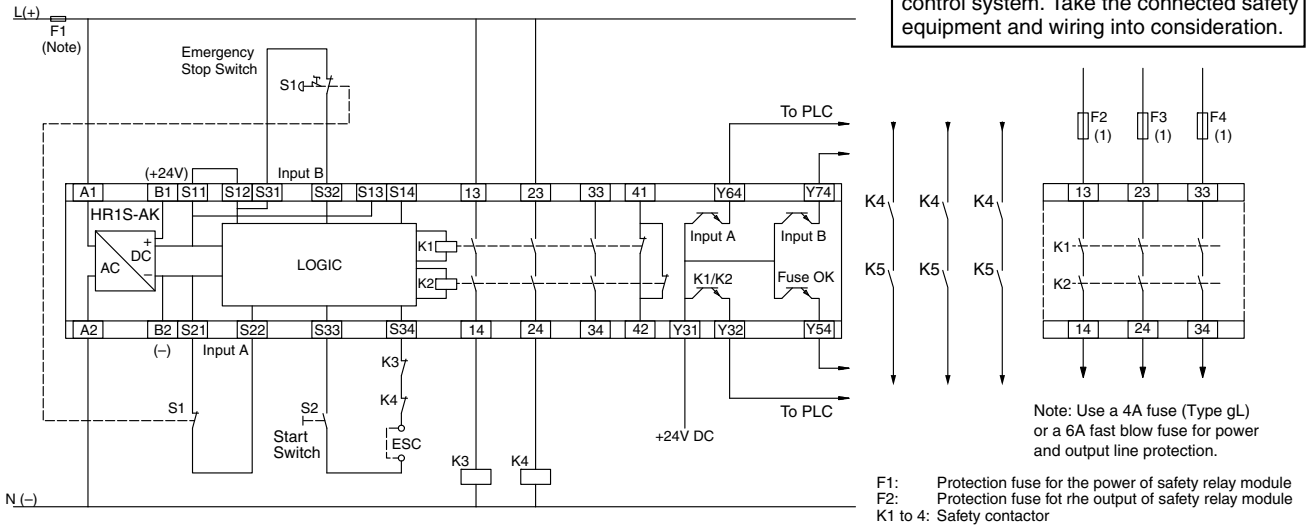
Wiring Diagram

Note: Be sure to connect terminals to correct power supply.

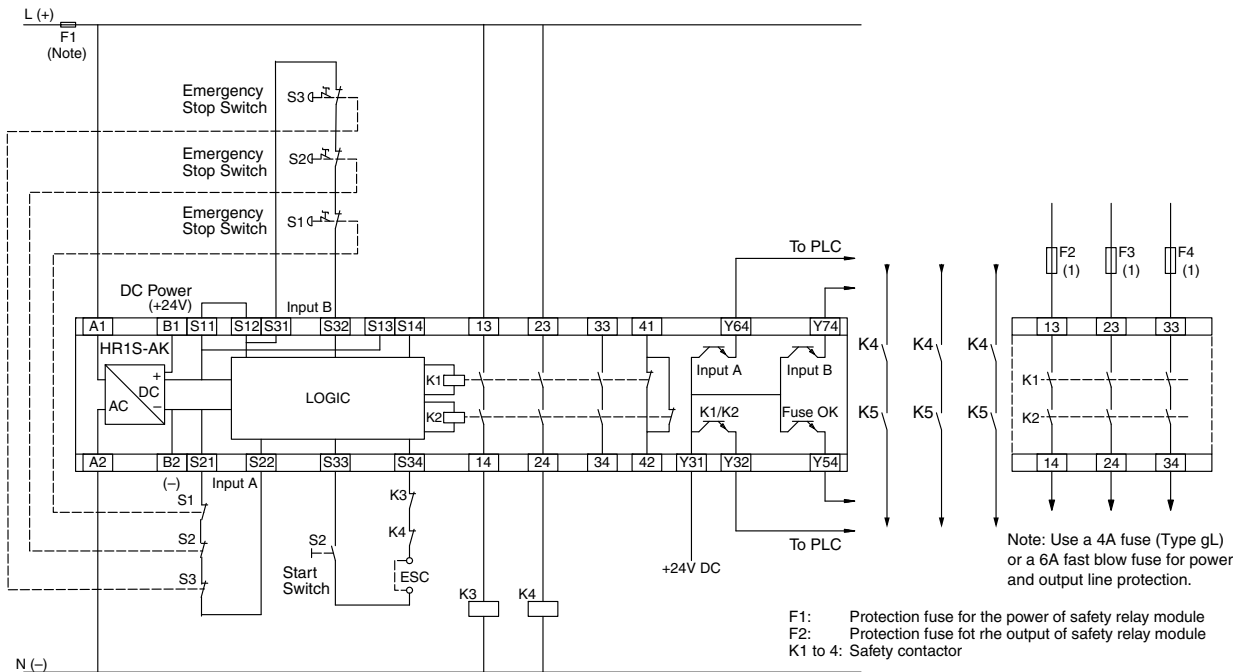
AC power: A1-A2

DC power: B1-B2

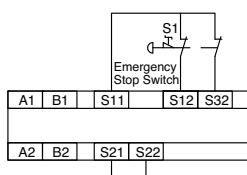
Safety Category 4 Circuit (using an emergency stop switch)



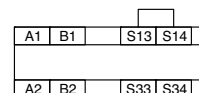
Safety Category 3 Circuit (using multiple emergency stop switches)



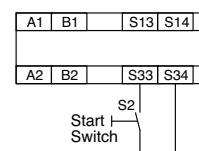
Although two input channels are used, short-circuit cannot be detected in the wiring shown below. Safety category becomes 3.



When not using a start switch (automatic start)



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



Flush Silhouette
Switches & Pilot Lights
Display Lights
LED Illumination Units
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Safety Products
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Comm. Terminals
AS-Interface
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Sockets
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Power Supplies
PLCs & SmartRelay
Operator Interfaces
Sensors
Control Stations
Explosion Protection
References

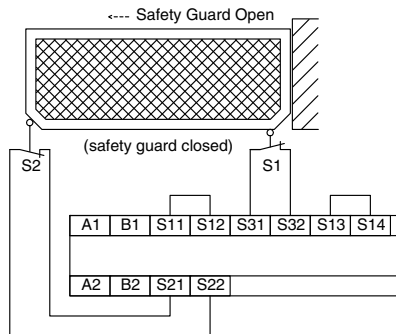
HR1S-AK Safety Relay Modules

Wiring Diagram with Safety Equipment

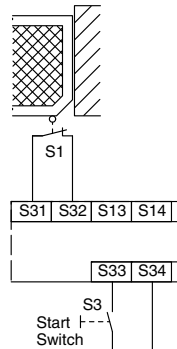
Applicable safety category depends on the function of connected safety equipment. Confirm the function of safety equipment before use.

Two limit switches/without synchronization monitor

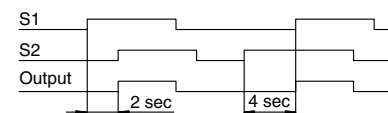
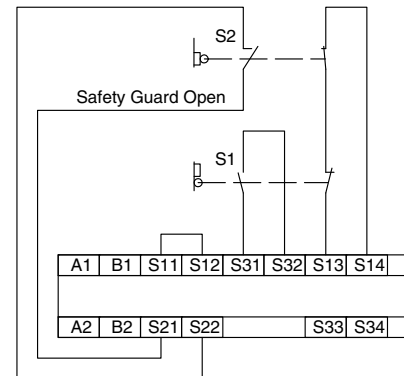
Automatic Start



Using a Start Switch

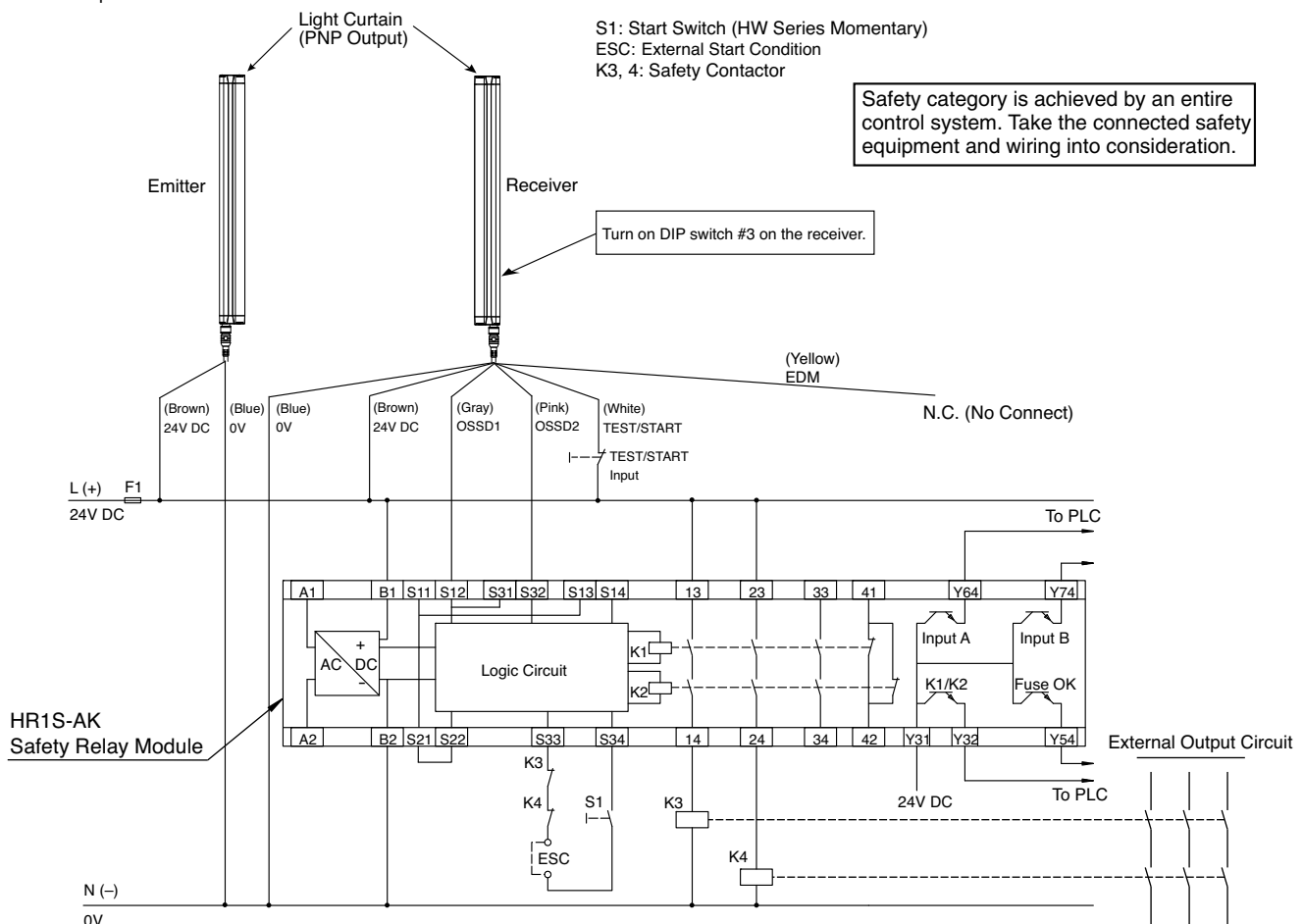


Two limit switches with synchronization monitor
(Synchronization monitor is effective for automatic start only.)



When connecting with light a curtain

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

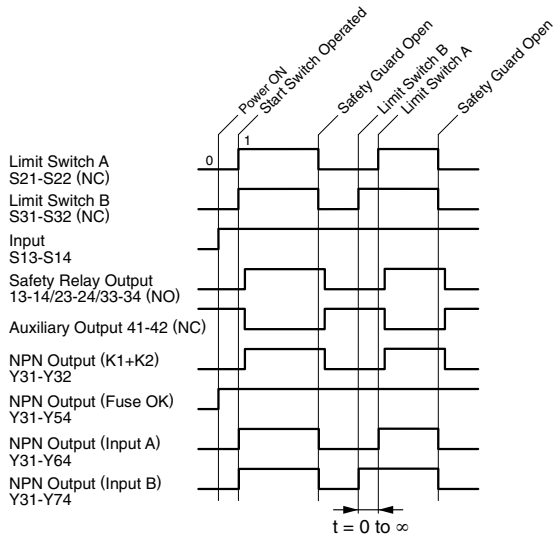


The light curtains are used in the above system.

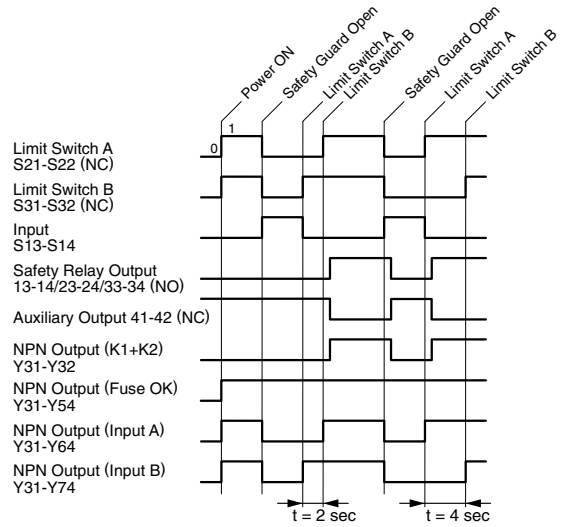
HR1S-AK Safety Relay Modules

Operation Chart

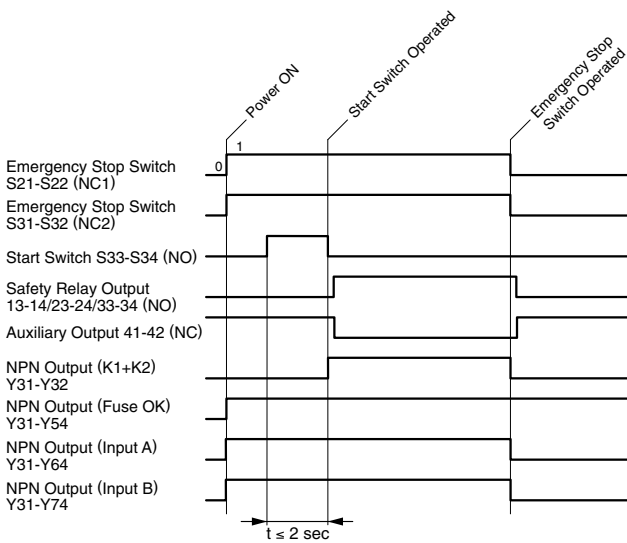
Safety guard application using two limit switches (automatic start mode)



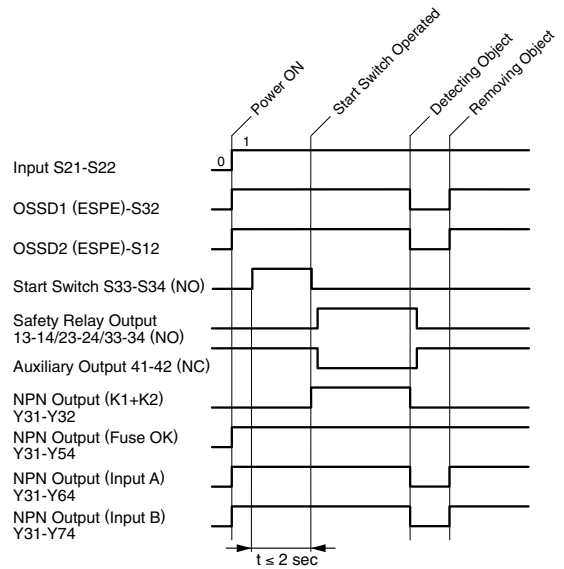
Safety guard application using two limit switches (automatic start mode, synchronization monitor mode)



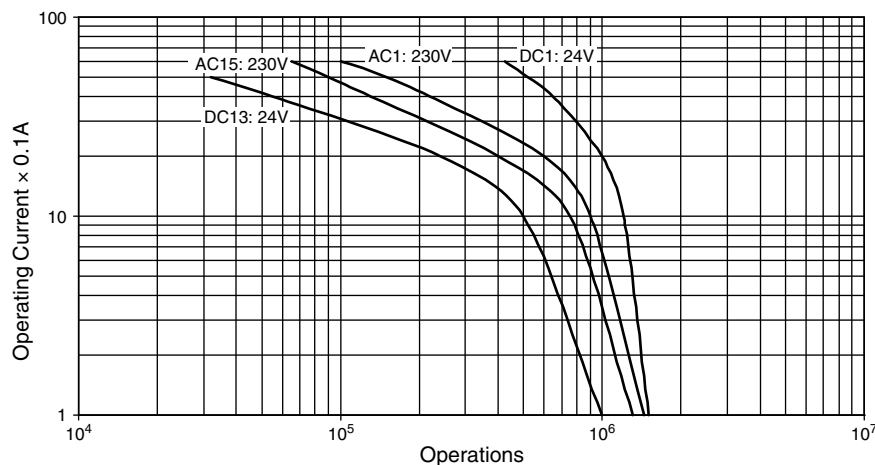
Using emergency stop switches (start switch monitor mode)



Using OSSD output of light curtain (ESPE)



Output Contact Electrical Life



Flush Silhouette
Switches & Pilot Lights
Display Lights
LED Illumination Units
Display Units
Safety Products
Terminal Blocks
Comm. Terminals
AS-Interface
Relays & Timers
Sockets
Circuit Protectors
Power Supplies
PLCs & SmartRelay
Operator Interfaces
Sensors
Control Stations
Explosion Protection
References

HR1S Safety Relay Modules

Residual Risk (EN292-1, 5.5)

The wiring diagrams in this catalog have been tested under actual operating conditions. The HR1S safety relay module can be used in a safety circuit by connecting to the safety equipment compliant to applicable standards. Consider residual risk in the following circumstances.

1. When circuits other than described in this catalog are used.

2. When the applicable standards of machine operation are not observed, or when the machine is not adjusted or maintained properly (observe the maintenance schedule strictly).

3. When the contacts of relays and contactors for connecting with safety outputs are not forced guide compliant with EN 50205.

Instructions

HR1S Safety Relay Modules

- Do not disassemble the safety relay modules. Do not damage the seal.
- Negligence to observe the following instructions may cause accidents that result in death or serious injuries.
 - **Connect the wires according to the wiring diagrams shown in this catalog.**
 - **Connect the wires according to the applicable standards.**
 - **The contacts of relays and contactors to connect with safety outputs must be forced guided compliant with EN 50205.**
 - **When maintaining or adjusting the machines, observe the maintenance schedule.**
- Turn the power off before installation, removal, wire connection, maintenance, or inspection of the safety relay module in order to avoid electric shock or fire. Otherwise death or serious injury may be caused.
- When installing and wiring, provide sufficient distance from inverter or power line.

HR1S-AC

- Use 13-14, 23-24, and 33-34 outputs for stop category 0 compliant with EN 60204-1/EN 418.
- Do not use Y43-Y44 outputs for safety-related circuits.

HR1S-AF

- Use 13-14, 23-24, and 33-34 outputs for stop category 0 compliant with EN 60204-1/EN 418.
- In order to detect the failure of start switch such as contact welding, connect start switch to S33-S34. Contact welding cannot be detected when the start switch is connected to S33-S39, because the output circuit closes when the start switch closes.

HR1S-AK

- Use 13-14, 23-24, and 33-34 outputs for stop category 0 compliant with EN 60204-1/EN 418.
- Do not use 41-42, Y31-Y32, Y31-Y54, Y31-Y64, or Y31-Y74 outputs for safety-related circuits.

HR1S-ATE Safety Relay Modules

New compact safety relay modules. Size is reduced by 50% from conventional models. Plug-in terminal structure enables simple wiring.

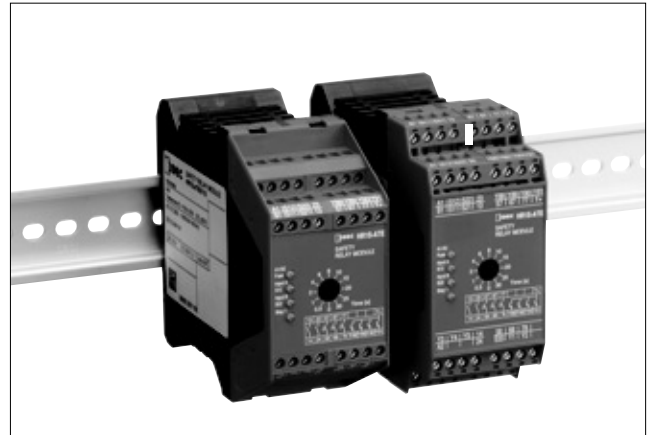
- EN ISO 13849-1 performance level e, safety category 4 compliant, and EN 62061 safety integrity level 3.
- Integrated and removable terminal styles available.
- Compact design: 45 mm in width.
- Time delay outputs: 3NO
- Auxiliary output enables power supply monitoring, inputs (2 channels), and a time delay output.
- UL Listed, CSA certified, TÜV NORD approved.

Package Quantity: 1

Part No.	Terminal Style
HR1S-ATE5110	Integrated Terminal Block
HR1S-ATE5110P	Removable Terminal Block

Specifications

Applicable Standards		EN 60204-1: 2006 EN 60947-1: 2007 EN 60947-5-1:2004 EN 61000-6-2: 2005 EN 61000-6-4: 2007 EN 62061: 2005 EN ISO 13849-1: 2008 EN ISO 13849-2: 2008
Applicable Standards for Use		EN 60204-1: 2006 EN ISO 13850: 2008
Performance level (PL)		e (EN ISO 13849-1)
Safety Category		4 (EN ISO 13849-1)
Safety Integrity Level (SIL)		3 (EN 62061)
Stop Category		0, 1 (EN 60204-1) (Note)
Operating Temperature		−10 to +55°C (no freezing)
Relative Humidity		30 to 85% RH (no condensation)
Impulse Withstand Voltage		4 kV (IEC 60947-5-1)
Shock Resistance		150 m/s ² , 11m sec, 3 shocks in each 3 axes
Vibration Resistance		10 to 60 Hz, amplitude 0.35 mm 60 to 150 Hz, acceleration 50 m/s ²
Degree of Protection		Terminal: IP20 Enclosure: IP40
Rated Voltage		24V AC −20% +10% 24V DC −20% +20%
Power Consumption		24V AC: 8 VA max. 24V DC: 4W max.
Overcurrent Protection		Built-in, electronic
Minimal Applicable Load		17V DC / 10 mA (initial value)
Response Time		ON→OFF: 20 ms max. (instantaneous output)
Overvoltage Category		III
Pollution Degree		2
Rated Insulation Voltage		300V AC
No. of Outputs	Safety Circuit	2NO
	Time-delay Circuit	3NO
Auxiliary Circuit	Contact	—
	Transistor	4
Output Contact Ratings	Safety Circuit	AC15 C300 (U _e = 230V AC / I _e = 0.75A)
	DC13	24V DC / I _e =1A
	Time-delay Circuit	AC15 C300 (U _e = 230V AC / I _e =0.75A)
	DC13	U _e = 24V DC / I _e =1A
	Preset Time	0, 0.5, 1, 2, 4, 6, 8, 10, 15, 20, 25, 30 sec.
Auxiliary Circuit		24V DC / 20 mA (PNP)
Mechanical Durability		10,000,000 operations
Electrical Durability		See page 989.
Rated Current		Total output: 8A max. 1 output 4A max.



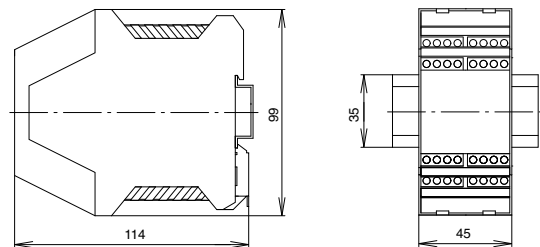
Wire Size	HR1S-ATE5110	Single wire: 0.2 to 2.5 mm ² max. (24~14 AWG) Multiple wires: 0.14 to 0.75 mm ² max.
	HR1S-ATE5110P	Single wire: 0.2 to 2.5 mm ² max. (24~14 AWG) Multiple wires: 0.2 to 1.5 mm ² max.
Weight (approx.)		280g

Note: Safety output contact Stop category 0
Time-delay output contact Stop category 1

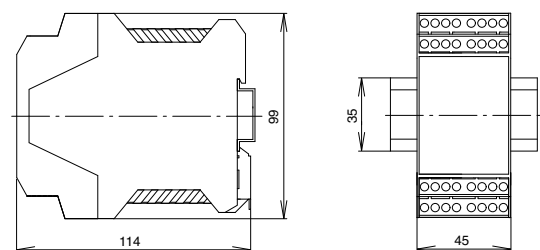
- Use a 4A fuse (Type gG) for power protection. Use a 6A fuse (Type gG) for safety output protection. Use a 4A fuse (Type gG) for time-delay output and auxiliary output protection.

Dimensions

HR1S-ATE5110 Integrated Terminal

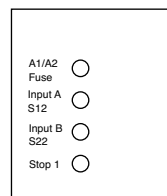


HR1S-ATE5110P Removable Terminal



All dimensions in mm.

LED Indicator



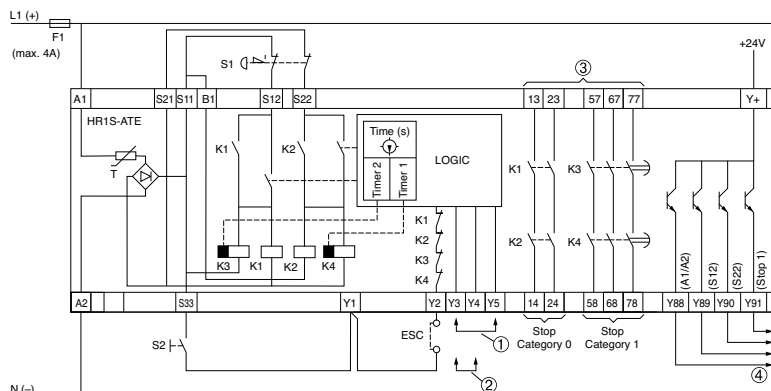
- A1/A2 Fuse: Turns on when power circuit is normal.
- Input A S12: Turns on when S11–S12 is closed.
- Input B S22: Turns on when S21–S22 is closed.
- Stop1: Turns on when the time-delay output circuits 57-58, 67-68, and 77-78 are closed.

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HR1S-ATE Safety Relay Modules

Wiring Diagram

Safety Category 4 (3) Circuit (using an emergency stop switch) (Note)

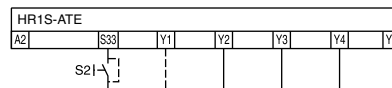


- ① When monitoring the start switch, starts when switched off (default setting/recommended)
 ② When monitoring the start switch, starts when switched on
 ③ Outputs must be fused (see the instruction manual for maximum fuse size)
 ④ To PLC, etc.
 Note: When using off-delay output, safety category becomes 3.

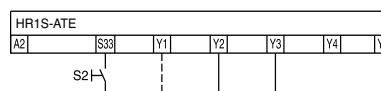
S1 = Emergency stop switch with 2 NC contacts (recommended)
 S2 = Start switch
 ESC = External start conditions
 Y1 (S33) – Y2 = Feedback loop

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

When not monitoring the start switch (Y3-Y4 short-circuited) (automatic start when S33-Y2 is short-circuited)

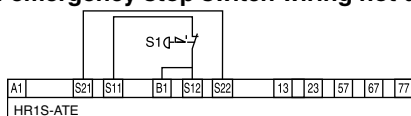


When monitoring the start switch (Y3-Y5 short-circuited)



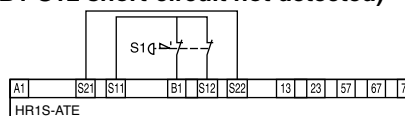
Emergency stop switch - Input 1 channel

When not detecting short-circuit (All failures such as short-circuit of emergency stop switch wiring not detected)

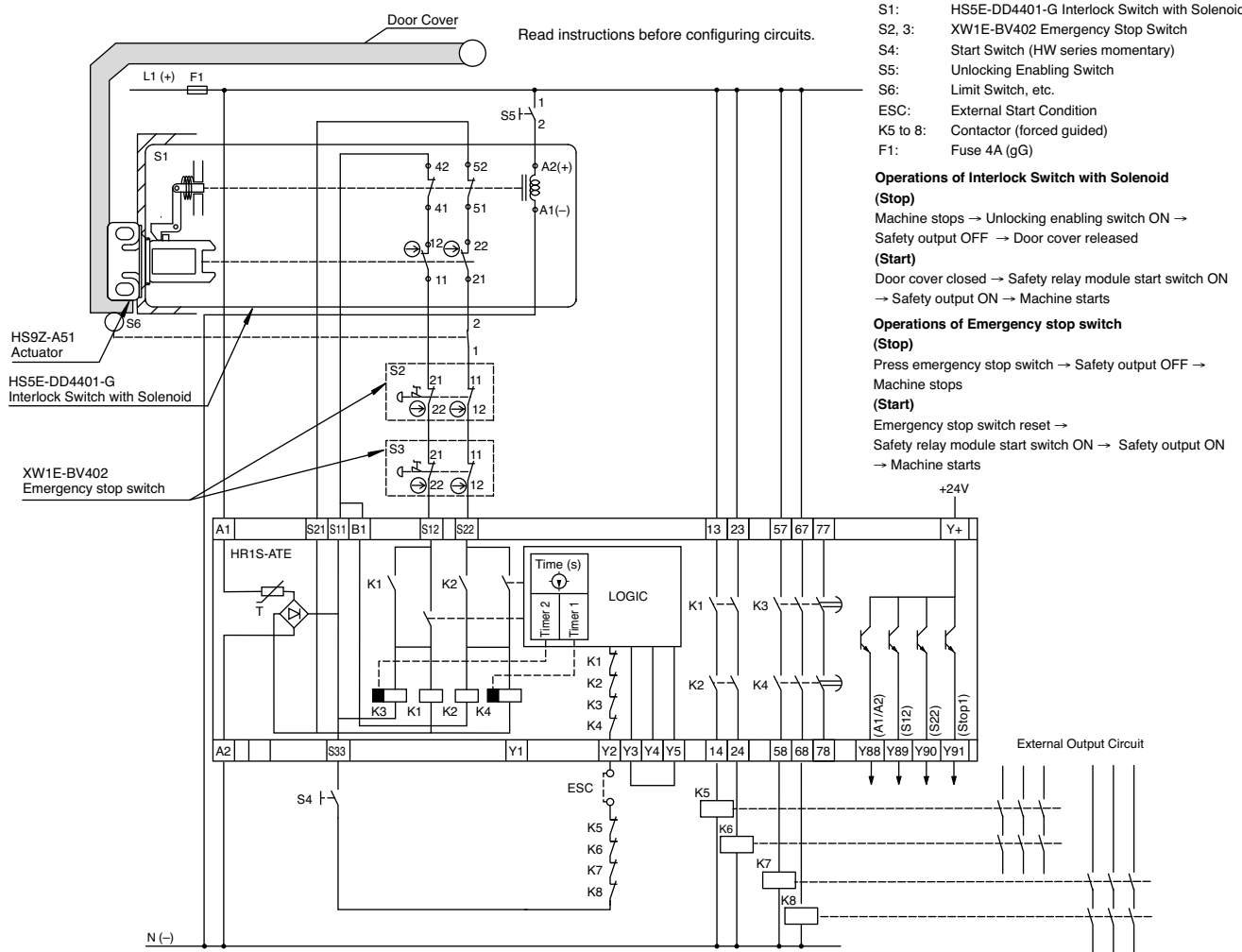


Emergency stop switch - Input 2 channels

When not detecting short-circuit (B1-S12 short-circuit not detected)

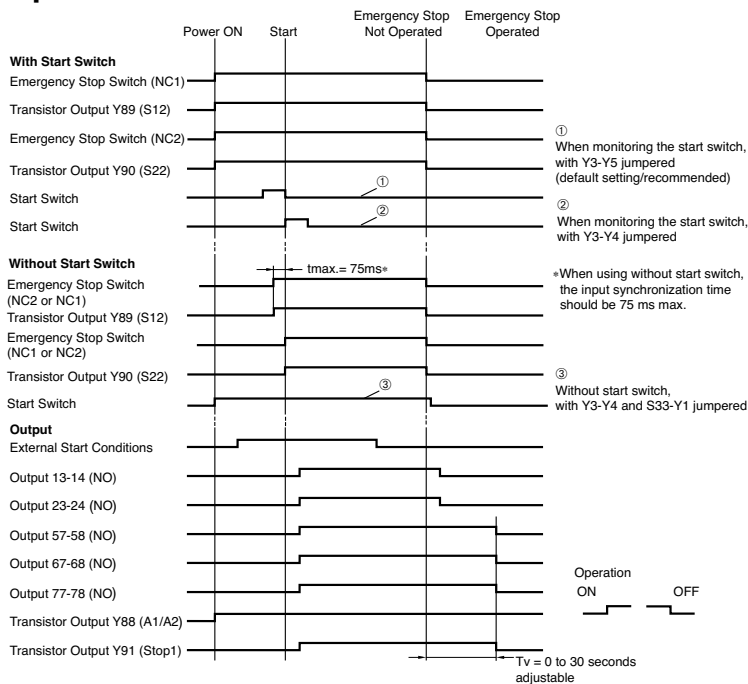


Safety Category 3 Circuit (using multiple emergency stop switches)

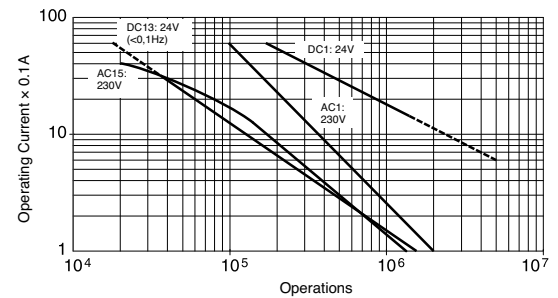


HR1S-ATE Safety Relay Modules

Operation Chart



Output Contact Electrical Life (Safety Circuit, Time-delay Circuit, Auxiliary Circuit)



Residual Risk (EN ISO/ISO12100-1)

The wiring diagrams on page 988 have been tested under actual operating conditions. The HR1S-ATE safety relay module can be used in a safety circuit by connecting to safety equipment compliant to applicable standards. Consider residual risk in the following circumstances:

a) When it is necessary to modify the recommended circuit and if added/modified components are not properly integrated into the control circuit.

b) When applicable standards of machine operation are not observed, or when the machine is not adjusted or maintained properly (adhere to a strict maintenance schedule).

c) When the contacts of relays and contactors for connected with safety outputs are not forced guided (compliant with EN 50205).

Instructions

- Only persons with technical expertise may install, startup, modify, or retrofit the HR1S-ATE safety relay module.
- Turn the power off before installation, removal, wiring, maintenance, or inspection of the safety relay module. If an error occurs, line voltage may be present at the control circuit in devices without DC isolation.
- Observe all electrical safety regulations issued by appropriate technical authorities or trade association. The safety function can be lost if the device is not used for its intended purpose.
- Do not open the housing or perform invalid operation, otherwise the warranty will become voided.
- Negligence to observe the following instructions may cause accidents that may result in death or serious injuries.
- Connect the wires according to the wiring diagrams shown on page 988.
- Connect the wires according to applicable standards.
- The contacts of relays and contactors to connected with safety outputs must be forced guided (compliant with EN 50205).
- For external fusing, use an appropriate fuse size and connect according to the wiring diagram on page 988.
- When maintaining or adjusting machines, observe the maintenance schedule.
- If the recommended circuit is modified or if components are added/modified, make sure that they are properly integrated into the control circuit.
- Relays must have mechanically-linked contacts.
- Follow required standards applicable to the operation of the machine. When maintaining or adjusting machines, observe a proper maintenance schedule.

- Do not use the module if it has been subjected to improper or incorrect use. In this case, the warranty will be voided.
- Do not use the HR1S-ATE under stressful conditions such as irregular voltage, current, temperature, or humidity.
- Before starting up your equipment for the first time, be sure to check all safety functions according to regulations and observe the specified test cycles for safety equipment.
- Perform the following precautionary steps prior to installation, assembly, or disassembly of the system.
 1. Disconnect the supply voltage to the equipment / system prior to starting work.
 2. To prevent accidental activation of the module or system, perform lock-out or tag-out.
 3. Make sure that no voltage is applied.
 4. Ground N (–) as shown in the wiring diagram on page 988.
 5. Protect against adjacent operating components using guards or barriers.
 6. The devices must be installed in a cabinet with a protection class of at least IP54.
- Contact Protection
 - Type of protection according to EN/IEC 60529
 - Housing / Terminals: IP40 / IP20
 - Finger-safe protection according to EN 50274
- Connect external fuse according to the wiring diagram on page 988.

