

Non-contact Interlock Switches

HS7A Series






Compact and easy positioning.



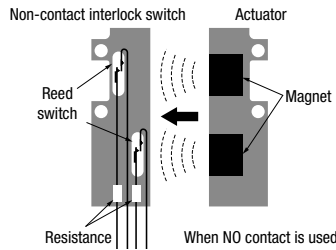
• See website for details on approvals and standards.

* Non-contact interlock switches can be used as an interlock switch only when used with a safety relay module designated by IDEC.

	Model	Features	Page
	HS7A-DMC	2-contact	E-095
	HS7A-DMP	3-contact	E-099
	HR1S-DMB/-DME HR1S-AF	Safety Relay Modules for Non-contact Interlock Switches	E-102

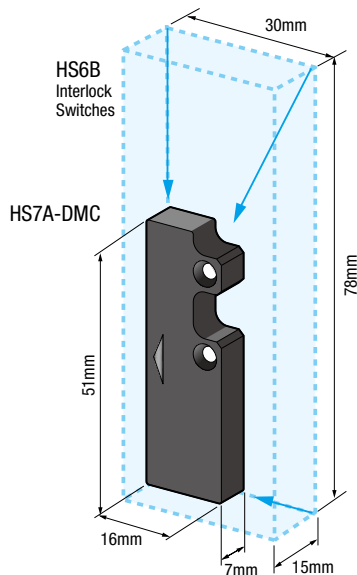
Operating principle (Reed switch)

The reed switch inside the non-contact interlock switch turns ON (NO contact) or OFF (NC contact) when the magnet of the actuator comes close to the non-contact interlock switch.



The switch cannot be defeated with a commercial magnet or a metal piece because multiple magnets are used.

Compact



Easy positioning

Non-contact interlock switches are ideal for mounting on protective doors that are difficult to position as there is space allowance to position with the actuator.



Safety category 4 (EN/ISO13849-1) compliant

By using the HS7A non-contact interlock switch with HR1S safety module, up to safety category 4 (EN/ISO13849-1) can be achieved.



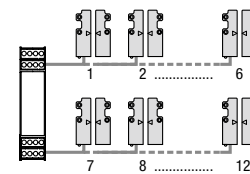
IP67

Because the reed switch is filled with plastic, the switches have strong dust and waterproof characteristics and can be washed with water.

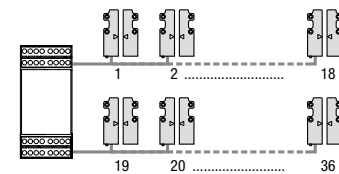


Connects up to 36 units

HR1S-DMB Can connect up to 12 units



HR1S-DME Can connect up to 36 units

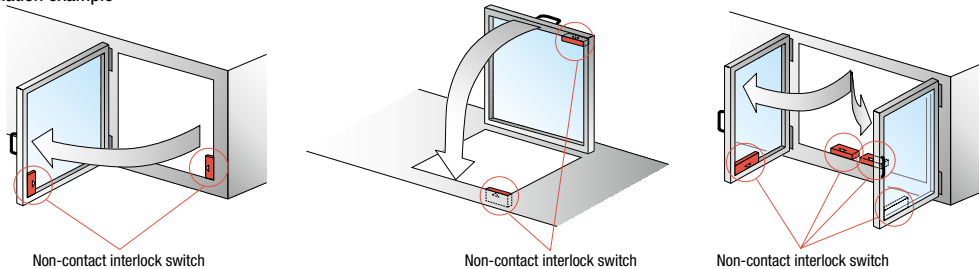


- Safety category 3 can be achieved when connecting two or more non-contact interlock switches per one input.
- Safety category 4 can be achieved when connecting one non-contact interlock switches per one input.
- The maximum number of units that can be connected differs depending on the existence of LEDs. See E-095, E-099.

Requirements for using the non-contact interlock switches correctly

Non-contact interlock switches do not have a direct opening function where a circuit is always shut off when the guard is opened. Therefore, a non-contact interlock switch must be used in combination with an exclusive safety relay module.

Installation example



Download catalogs and CAD from <http://eu.idec.com/downloads>

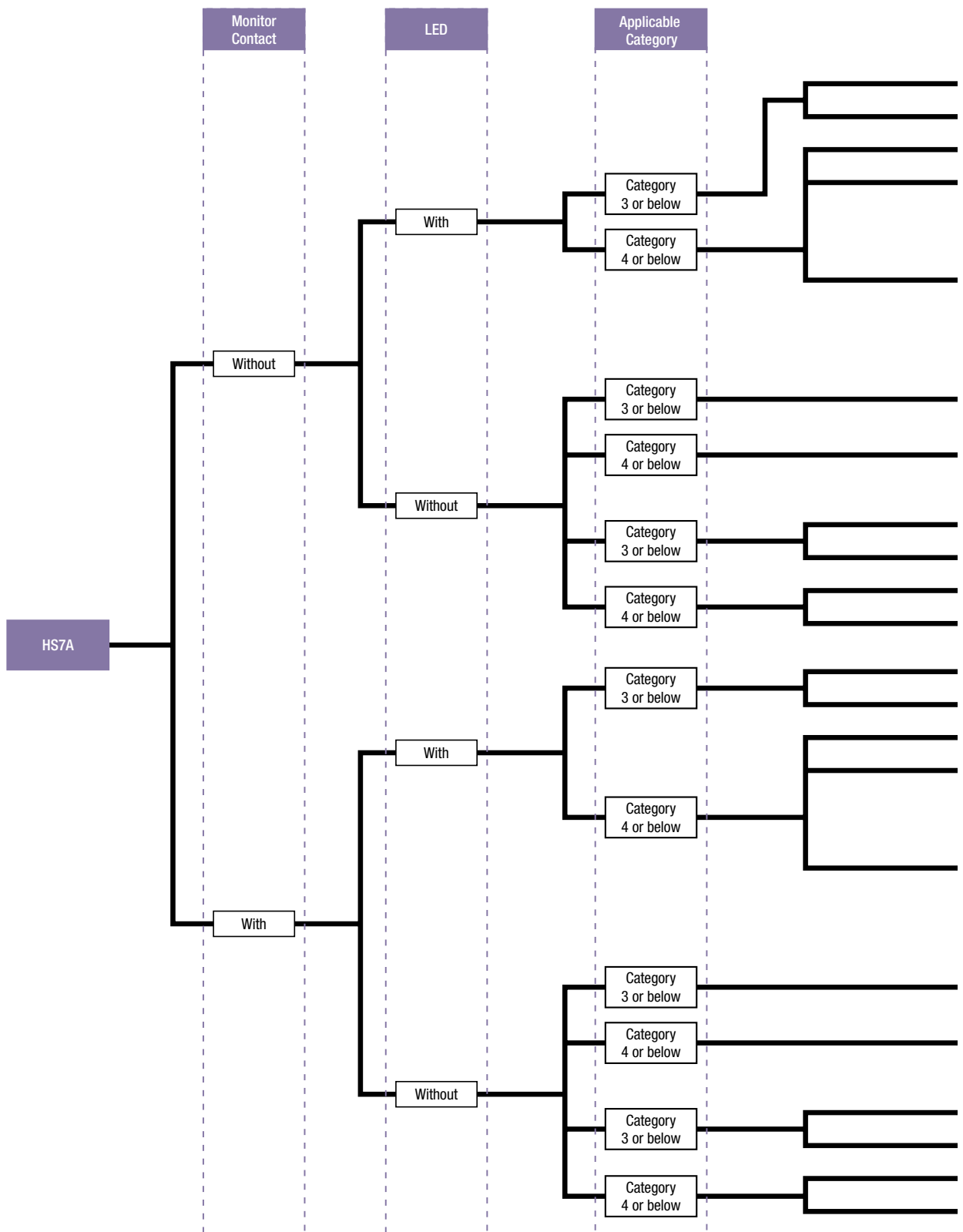
- APEM
- Switches & Pilot Lights
- Control Boxes
- Emergency Stop Switches
- Enabling Switches
- Safety Products
- Explosion Proof
- Terminal Blocks
- Relays & Sockets
- Circuit Protectors
- Power Supplies
- LED Illumination
- Controllers
- Operator Interfaces
- Sensors
- AUTO-ID
- Interlock Switches
- Non-contact Interlock Switches
- Safety Laser Scanners
- Safety Light Curtains
- Safety Modules

- HS7A
- HR1S
- HS3A

HS7A Non-contact Interlock Switches

Safety Products

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- HS3A

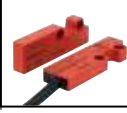

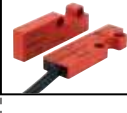















E-093

For more information, visit <http://eu.idec.com>

HS7A Non-contact Interlock Switches

Safety Products

Maximum Number of Connected Units	Safety Relay Module	Style	Marking	Page	Contact Configuration
6	HR1S-DMB	 HS7A-DMC591□	 UL LISTED SP CE	E-095	1NC + 1NO
18	HR1S-DME				
2	HR1S-DMB				
6	HR1S-DME				
1	HR1S-AF	 HS7A-DMC791□	 UL LISTED SP CE	E-095	2NO
6	HR1S-AF	 HS7A-DMC790□	 UL LISTED SP CE	E-095	2NO
1	HR1S-AF				
12	HR1S-DMB	 HS7A-DMC590□	 UL LISTED SP CE	E-095	1NC + 1NO
36	HR1S-DME				
2	HR1S-DMB				
6	HR1S-DME				
6	HR1S-DMB	 HS7A-DMP501□	 UL LISTED SP CE	E-099	1NO + 2NC
18	HR1S-DME				
2	HR1S-DMB				
6	HR1S-DME				
1	HR1S-AF	 HS7A-DMP701□	 UL LISTED SP CE	E-099	2NO + 1NC
6	HR1S-AF	 HS7A-DMP700□	 UL LISTED SP CE	E-099	2NO + 1NC
1	HR1S-AF				
12	HR1S-DMB	 HS7A-DMP500□	 UL LISTED SP CE	E-099	1NO + 2NC
36	HR1S-DME				
2	HR1S-DMB				
6	HR1S-DME				

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- HS7A
- HR1S
- HS3A

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E-094

HS7A-DMC Non-contact Interlock Switches

Compact size and easy positioning.

Combination with proprietary relay modules achieves safety category 4 (EN ISO 13849-1).



HS7A Non-contact Interlock Switches

Contact Configuration	Cable Length	LED	Part No.	Applicable Safety Relay Module
1NO+1NC	2m	Without	HS7A-DMC5902	HR1S-DMB1132 HR1S-DMB1132P HR1S-DME1132 HR1S-DME1132P
		With	HS7A-DMC5912	
	5m	Without	HS7A-DMC5905	
		With	HS7A-DMC5915	
2NO	2m	Without	HS7A-DMC7902	HR1S-AF5130B HR1S-AF5130PB
		With	HS7A-DMC7912	
	5m	Without	HS7A-DMC7905	
		With	HS7A-DMC7915	
10m	Without	HS7A-DMC7910		
	With	HS7A-DMC79110		

- Package quantity: 1
- The HS7A-DMC non-contact interlock switch is supplied with an HS9Z-ZC1 actuator.
- The contact configuration in the table above shows the contact status when the non-contact interlock switch is not activated.

HR1S Safety Relay Modules for Non-contact Interlock Switches

Safety Relay Module	Voltage	Number of Inputs	Max. Number of Connectable Non-contact Interlock Switches
HR1S-DMB1132	24V DC -20 to +20%	2	12
HR1S-DMB1132P			
HR1S-DME1132		6	36
HR1S-DME1132P			
HR1S-AF5130B	24V AC -15 to +10% 50/60 Hz 24V DC -15 to +10%	1	6
HR1S-AF5130PB			

- Safety category 3 can be achieved when connecting two or more non-contact interlock switches per one input.
- When connecting multiple non-contact interlock switches (HS7A-DMC790□), use HR1S-AF5130B/AF5130PB. (HS7A-DMC791□ cannot be connected in multiple numbers.)

Maximum Number of Connectable Non-contact Interlock Switches per Input of Safety Relay Module

Non-contact Interlock Switch	HS7A-DMC59□□		HS7A-DMC79□□	
	Without LED	With LED	Without LED	With LED
HR1S-DMB/DME	6	3	—	—
HR1S-AF5130B/AF5130PB	—	—	6	1

Accessory

Name	Part No.
Actuator	HS9Z-ZC1

- One HS9Z-ZC1 is supplied with each HS7A-DMC non-contact interlock switch.

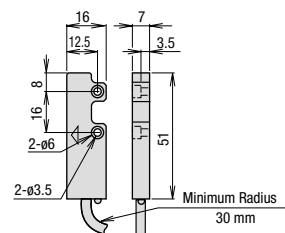
Specifications

Applicable Standards	IEC/EN 60947-5-1 UL508 (UL listed) CSA C22.2, No. 14	
Operating Temperature	-25 to +85°C (no freezing)	
Relative Humidity	30 to 85% RH (no condensation)	
Storage Temperature	-40 to +85°C (no freezing)	
Pollution Degree	3	
Electric Shock Protection	Class II (IEC 60536)	
Degree of Protection	IP67 (IEC 60529)	
Shock Resistance	300 m/s ² (11 ms) (IEC 60068-2-7)	
Vibration Resistance	100 m/s ² (10 to 150 Hz) (IEC 60068-2-6)	
Rated Voltage (Ue)	24V DC	
Rated Current (Ie)	100 mA	
Repeat Accuracy	10% maximum	
Maximum Operating Frequency	150 Hz	
Voltage Drop	I = 10 mA	0.1V (without LED) / 2.4V (with LED)
	I = 100 mA	1V (without LED) / 4.2V (with LED)
Housing Material	PBT	
Housing Color	Red	
Cable	AWG23 (0.25 mm ²) × 4 Cable length: 2m, 5m, 10m	
Weight (approx.)	HS7A-DMC: 100g (cable length: 2m) HS9Z-ZC1: 9g	

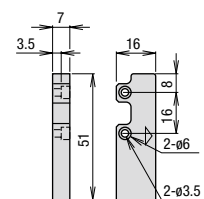
- See E-105 for specifications on HR1S-AF safety relay modules

Dimensions

HS7A-DMC (Non-contact Interlock Switch)



HS9Z-ZC1 (Actuator)



All dimensions in mm.

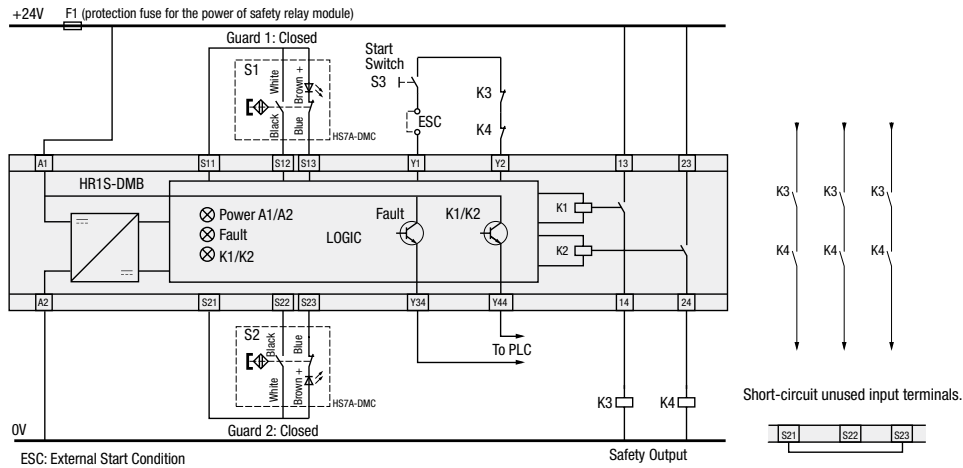
HS7A-DMC Non-contact Interlock Switches

Safety Products

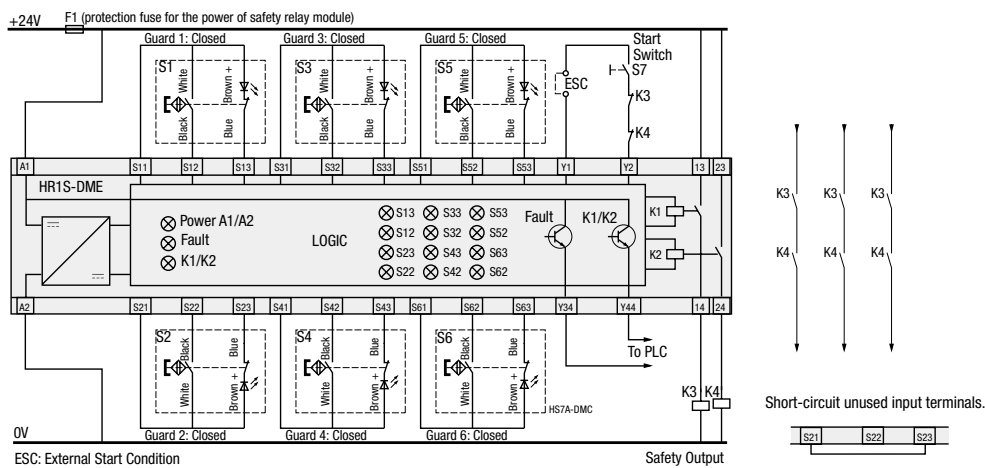
Wiring Diagram

⚠ The following diagrams show the contact statuses when the non-contact interlock switches are activated by the actuators. Below are examples of wiring diagrams.

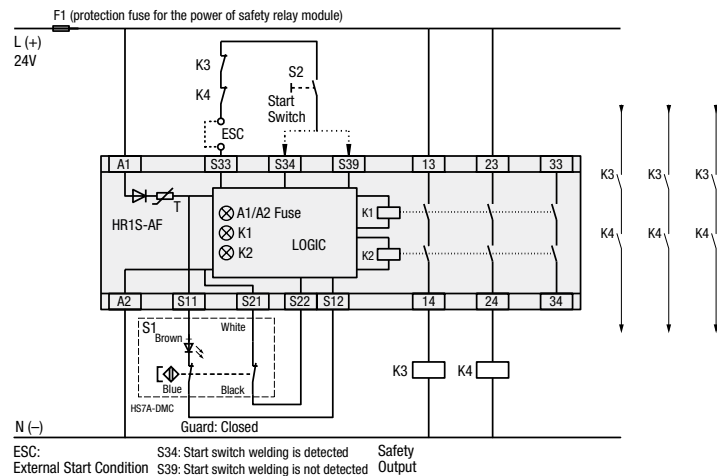
When using HR1S-DMB + HS7A-DMC591 (1N0+1NC) + HS9Z-ZC1



When using HR1S-DME + HS7A-DMC591 (1N0+1NC) + HS9Z-ZC1



When using HR1S-AF5130B/AF5130PB + HS7A-DMC791 (2N0) + HS9Z-ZC1 (Note)



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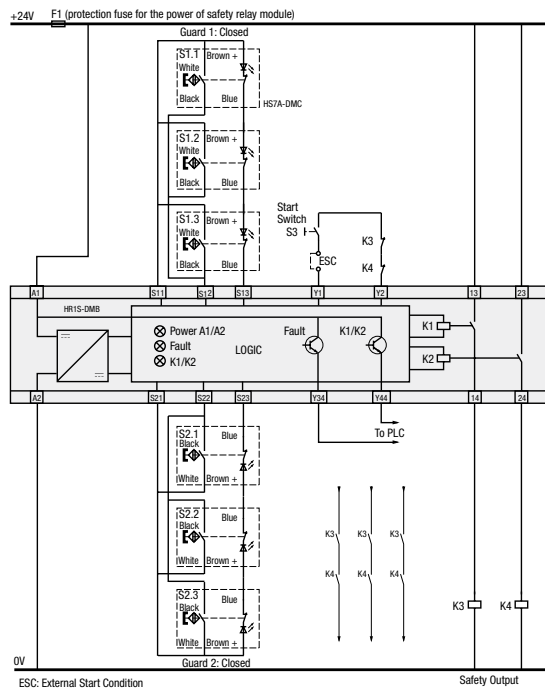
- APEM
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- Safety Light Curtains
- Safety Modules

- HS7A
- HR1S
- HS3A

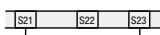
HS7A-DMC Non-contact Interlock Switches

Below are examples of wiring diagrams.

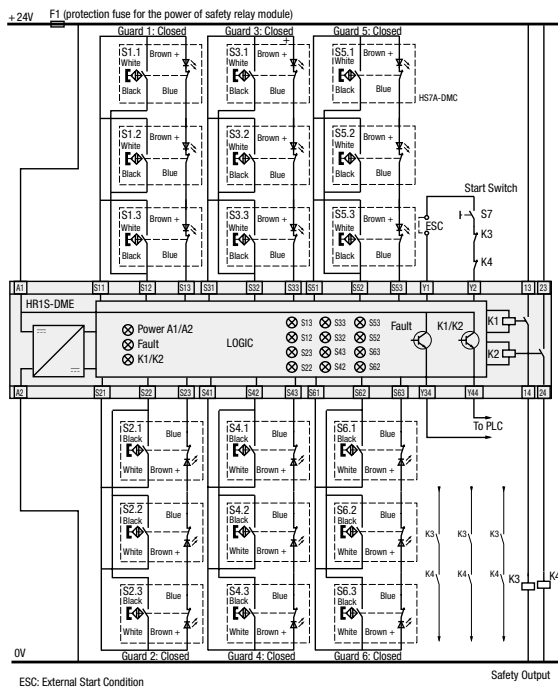
When using HR1S-DMB + HS7A-DMC591□ (1NO+1NC) + HS9Z-ZC1



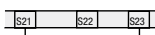
Short-circuit unused input terminals.



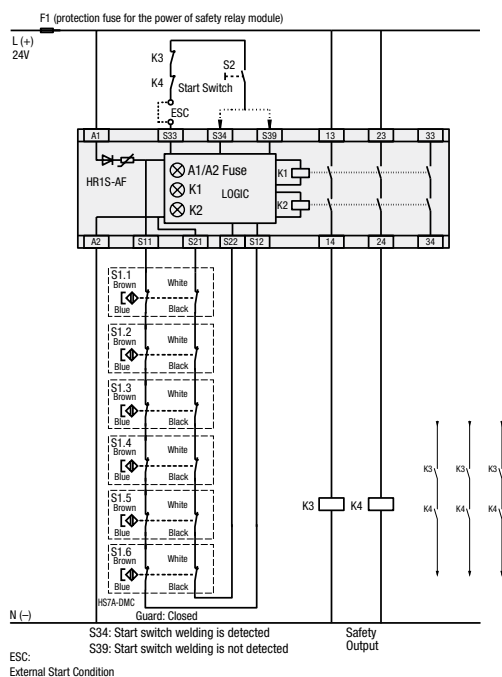
When using HR1S-DME + HS7A-DMC591□ (1NO+1NC) + HS9Z-ZC1



Short-circuit unused input terminals.



When using HR1S-AF5130B/AF5130PB + HS7A-DMC790□ (2NO) + HS9Z-ZC1



HS7A-DMC Non-contact Interlock Switches

⚠ Safety Precautions

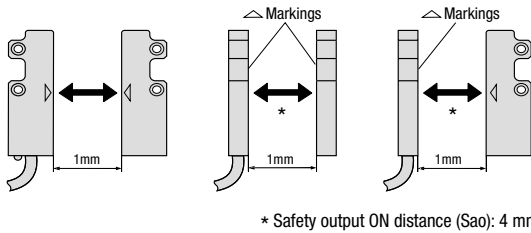
- In order to avoid electric shock or fire, turn power off before installation, removal, wire connection, maintenance, or inspection of the non-contact interlock switch.

- Do not install the actuator in the location where the human body may come in contact. Otherwise injury may occur.

Instructions

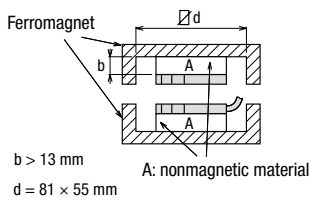
- Safety category 4 (EN ISO 13849-1) can be achieved by combining the HS7A non-contact interlock switch and HR1S safety relay module (monitor the dual contacts using the safety relay module).
- When using non-contact interlock switches, combine with a proprietary safety relay module and confirm that the conformable safety category and the safety category (EN ISO 13849-1) required to the machinery have been achieved.
- Be sure to use the HS7A non-contact interlock switch in combination with the proprietary actuator HS9Z-ZC1. Do not use other actuators.
- Regardless of door types, do not use the non-contact interlock switch as a door stop. Install a mechanical door stop on the edge of the door to protect the interlock switch against excessive force.
- A shock to the door exceeding 300 m/s² (approx. 30G) may cause a failure to the switch.
- Do not store the non-contact interlock switches in a dusty, humid, organic-gas atmosphere, or areas subject to direct sunlight.

Operating Direction

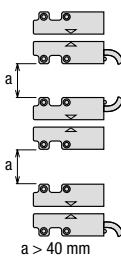


Precautions for Installation

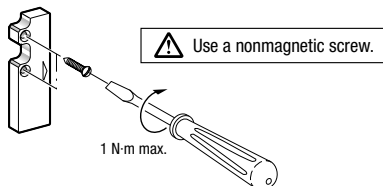
When installing on a ferromagnet



Close mounting

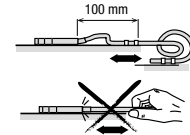


Tightening Torque



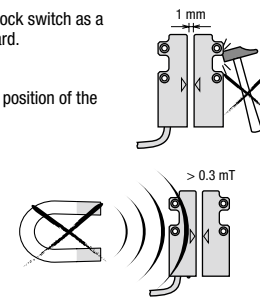
Precaution for Cable Wiring

- ⚠ Tensile force on the cable may cause disconnection. Be sure to secure the cable near the non-contact interlock switches.

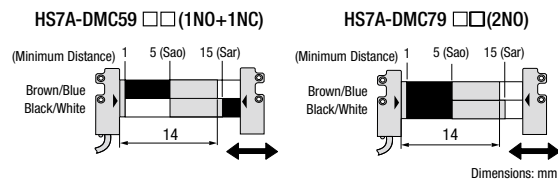


Precautions for Mounting the Actuator

- ⚠ Do not use the non-contact interlock switch as a mechanical stop for movable guard.
- ⚠ Do not use a hammer to adjust a position of the non-contact interlock switch.
- ⚠ Do not use the non-contact interlock switch in a magnetic field of 0.3 mT or over.



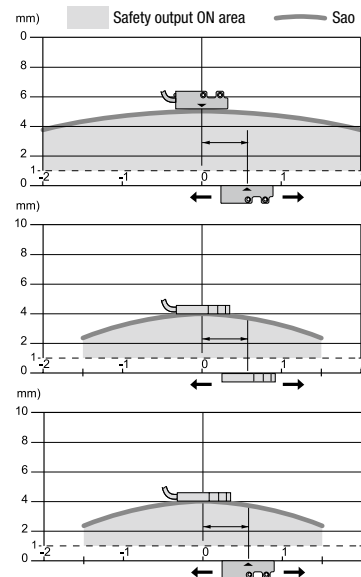
Operation Chart



Contact Status

■ Contact Closed (1)	Sao: Assured operating distance where the safety output is sure to turn on.
□ Contact Open (0)	Sar: Assured release distance where the safety output is sure to turn off.
■ Transient State	Note: When the transfer time between the actuator's Sao-Sar is 500 ms or longer, the time lag is detected as an error.

Operation Area



- APEM
- Switches & Pilot Lights
- Control Boxes
- Emergency Stop Switches
- Enabling Switches
- Safety Products
- Explosion Proof
- Terminal Blocks
- Relays & Sockets
- Circuit Protectors
- Power Supplies
- LED Illumination
- Controllers
- Operator Interfaces
- Sensors
- AUTO-ID
- Interlock Switches
- Non-contact Interlock Switches
- Safety Laser Scanners
- Safety Light Curtains
- Safety Modules

- HS7A
- HR1S
- HS3A

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HS7A-DMP Non-contact Interlock Switches (3-contact)



- APEM
- Switches & Pilot Lights
- Control Boxes
- Emergency Stop Switches
- Enabling Switches
- Safety Products**
- Explosion Proof
- Terminal Blocks
- Relays & Sockets
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- LED Illumination
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- Operator Interfaces
- Sensors
- AUTO-ID
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- Non-contact Interlock Switches
- Safety Laser Scanners
- Safety Light Curtains
- Safety Modules

HS7A Non-contact Interlock Switches

Contact Configuration	Cable Length	LED	Part No.	Applicable Safety Relay Module
1NO+2NC	2m	Without	HS7A-DMP5002	HR1S-DMB1132 HR1S-DMB1132P
		With	HS7A-DMP5012	
	5m	Without	HS7A-DMP5005	HR1S-DME1132 HR1S-DME1132P
		With	HS7A-DMP5015	
2NO+1NC	2m	Without	HS7A-DMP7002	HR1S-AF5130B HR1S-AF5130PB
		With	HS7A-DMP7012	
	5m	Without	HS7A-DMP7005	
		With	HS7A-DMP7015	

- Package quantity: 1
- The HS7A-DMP non-contact interlock switch is supplied with an HS9Z-ZP1 actuator.
- The contact configuration in the table shows the contact status when the non-contact interlock switch is not activated.
- For details on relay modules for HS7A, see HR1S-DMB/DME (E-102) and HR1S-AF (E-105) of the catalog.

HR1S Safety Relay Module for Non-contact Interlock Switches

Safety Relay Module	Number of Inputs	Max. Number of Connectable Non-contact Interlock Switches
HR1S-DMB1132 HR1S-DMB1132P	2	12
HR1S-DME1132 HR1S-DME1132P	6	36
HR1S-AF5130B HR1S-AF5130PB	1	6

- When connecting multiple non-contact interlock switches (HS7A-DMP700□), use HR1S-AF5130B/AF5130PB. (HS7A-DMP701□ cannot be connected in multiple numbers.)

Maximum Number of Connectable Non-contact Interlock Switches per Input of Safety Relay Module

Non-contact Interlock Switch	HS7A-DMP50□□		HS7A-DMP70□□	
	Without LED	With LED	Without LED	With LED
HR1S-DMB/DME	6	3	—	—
HR1S-AF5130B/AF5130PB	—	—	6	1

Accessory

Name	Part No.
Actuator	HS9Z-ZP1

- One HS9Z-ZP1 is supplied with the HS7A-DMP non-contact interlock switch.

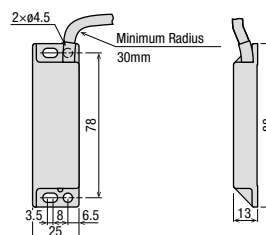
Specifications

Applicable Standards	IEC/EN 60947-5-1 UL508 (UL listed) CSA C22.2, No. 14	
Operating Temperature	-25 to 85°C (no freezing)	
Relative Humidity	35 to 85% RH (no condensation)	
Storage Temperature	-40 to +85°C (no freezing)	
Pollution Degree	3	
Electric Shock Protection	Class II (IEC 60536)	
Degree of Protection	IP67 (IEC 60529)	
Shock Resistance	300 m/s ² (11 ms) (IEC 60068-2-7)	
Vibration Resistance	100 m/s ² (10 to 150 Hz) (IEC 60068-2-6)	
Rated Voltage (Ue)	24V DC	
Rated Current (Ie)	100 mA	
Repeat Accuracy	10% maximum	
Maximum Operating Frequency	150 Hz	
Voltage Drop	I = 10 mA	0.1V (without LED), 2.4V (with LED)
	I = 100 mA	1V (without LED), 4.2V (with LED)
Electrical Durability	1,200,000 operations minimum	
Housing Material	PBT	
Housing Color	Red	
Cable	AWG23 (0.25 mm ²) × 6 Cable length: 2m, 5m	
Weight (approx.)	HS7A-DMP: 180g (cable length: 2 m) HS9Z-ZP1: 50g	

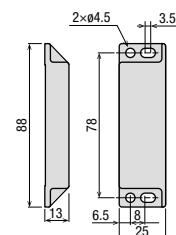
- For specifications on safety relay modules, see HR1S-DMB/DME (E-102) and HR1S-AF (E-105) of the catalog.

Dimensions

HS7A-DMP□□□□ (Non-contact Interlock Switch)



HS9Z-ZP1 (Actuator)



All dimensions in mm.

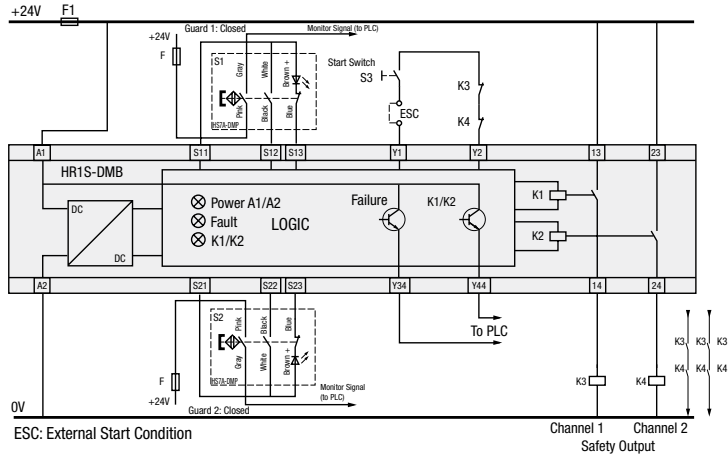
HS7A-DMP Non-contact Interlock Switches (3-contact)

Safety Products

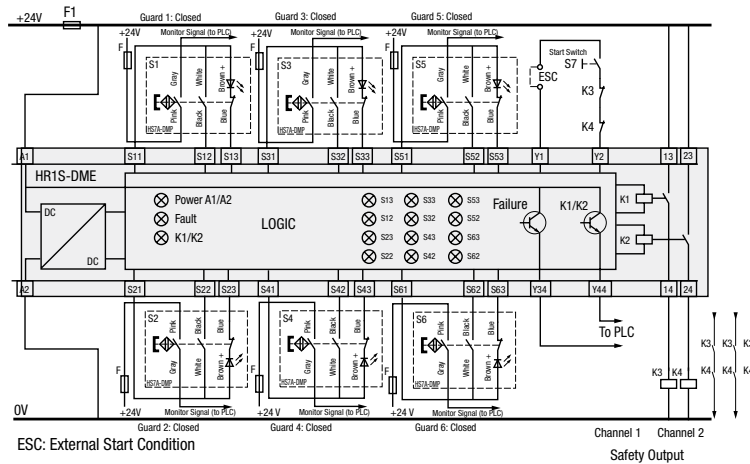
Wiring Diagram

⚠ The following diagrams show the contact statuses when the non-contact interlock switches are activated by the actuators. Below are examples of wiring diagrams.

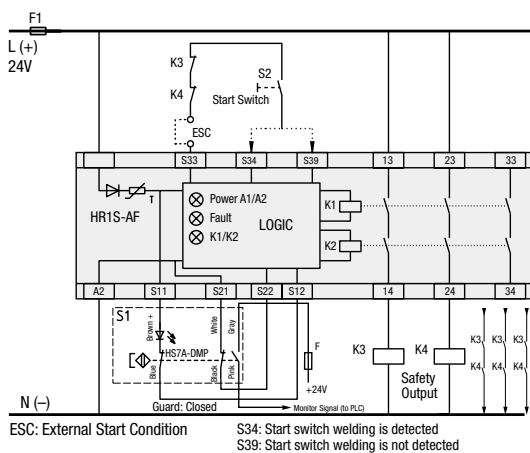
When using HR1S-DMB + HS7A-DMP50□□ (1NO+2NC) + HS9Z-ZP1



When using HR1S-DME + HS7A-DMP50□□ (1NO+2NC) + HS9Z-ZP1



When using HR1S-AF + HS7A-DMP70□□ (2NO+1NC) + HS9Z-ZP1



F1: Protection fuse for the power of safety relay module
F: Protection fuse for monitor signal contacts (max. 500mA gG (gL))

- APEM
- Switches & Pilot Lights
- Control Boxes
- Emergency Stop Switches
- Enabling Switches
- Safety Products
- Explosion Proof
- Terminal Blocks
- Relays & Sockets
- Circuit Protectors
- Power Supplies
- LED Illumination
- Controllers
- Operator Interfaces
- Sensors
- AUTO-ID
- Interlock Switches
- Non-contact Interlock Switches
- Safety Laser Scanners
- Safety Light Curtains
- Safety Modules

- HS7A
- HR1S
- HS3A

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HS7A-DMP Non-contact Interlock Switches(3-contact)

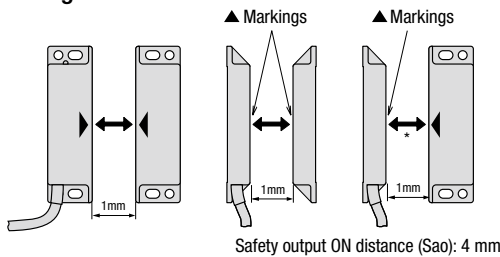
⚠ Safety Precautions

- In order to avoid electric shock or fire, turn the power off before installation, removal, wire connection, maintenance, or inspection of the non-contact interlock switch.
- Do not install the actuator in the location where the human body may come in contact. Otherwise injury may occur.

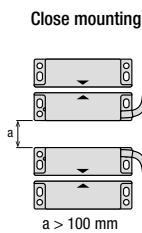
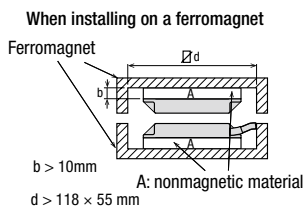
Instructions

- Safety category 4 (EN ISO 13849-1) can be achieved by combining the HS7A non-contact interlock switch and HR1S safety relay module (monitor the dual contacts using the safety relay module).
- When using non-contact interlock switches, combine with a proprietary safety relay module and confirm that the conformable safety category and the safety category (EN ISO 13849-1) required to the machinery have been achieved.
- Be sure to use the HS7A non-contact interlock switch in combination with the proprietary actuator HS9Z-ZP1. Do not use other actuators.
- Regardless of door types, do not use the non-contact interlock switch as a door stop. Install a mechanical door stop on the edge of the door to protect the interlock switch against excessive force.
- A shock to the door exceeding 300 m/s² (approx. 30G) may cause a failure to the non-contact interlock switches.
- Do not store the switches in a dusty, humid, organic-gas atmosphere, or areas subject to direct sunlight.

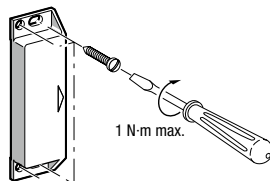
Operating Direction



Precautions for Installation



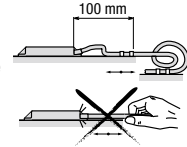
Tightening Torque



⚠ Use a nonmagnetic screw.

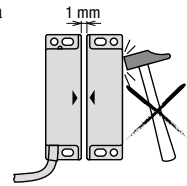
Precaution for Cable Wiring

- ⚠ Tensile force on the cable may cause disconnection. Be sure to secure the cable near the non-contact interlock switch.

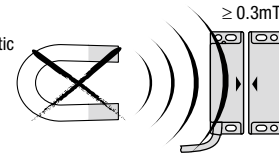


Precautions for Mounting Actuator

- ⚠ Do not use the non-contact interlock switch as a mechanical stop for the movable guard.
- ⚠ Do not use a hammer to adjust the position of non-contact interlock switch.

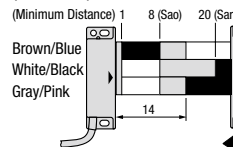


- ⚠ Do not use the non-contact interlock switch in a magnetic field of 0.3 mT or over.

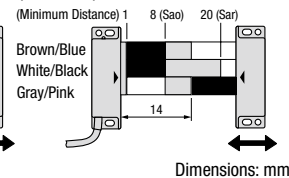


Operation Chart

HS7A-DMP50□□
(1NO+2NC)



HS7A-DMP70□□
(2NO+1NC)



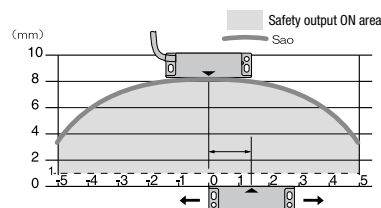
Contact Status

■	Contact closed (1)
□	Contact open (0)
▨	Transient area

Sao: Assured operating distance where the safety output is sure to turn on.
Sar: Assured release distance when the safety output is sure to turn off.

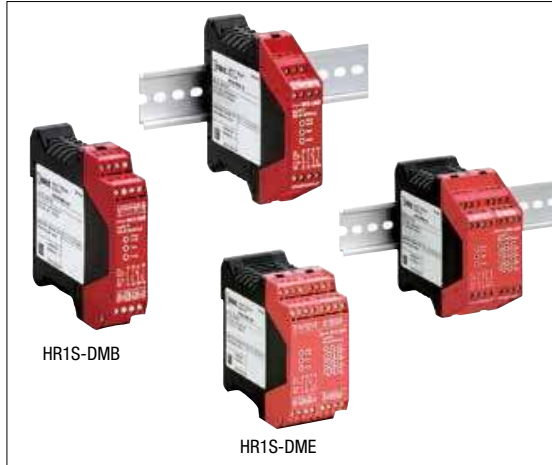
Note: When the transfer time between the actuator's Sao-Sar is 500 ms or longer, the time lag is detected as an error.

Operation Area



HR1S Series Safety Relay Modules for Non-contact Interlock Switches

HR1S-DMB/HR1S-DME



Part No.	Voltage	Terminal Style	Input
HR1S-DMB1132	24V DC	Integrated terminal block	2
HR1S-DMB1132P		Removable terminal block	
HR1S-DME1132	-20 to +20%	Integrated terminal block	6
HR1S-DME1132P		Removable terminal block	

- Package quantity: 1
- For the maximum number of connectable non-contact interlock switches, see HS7A-DMC (E-095) and HS7A-DMP (E-099) pages of the catalog.

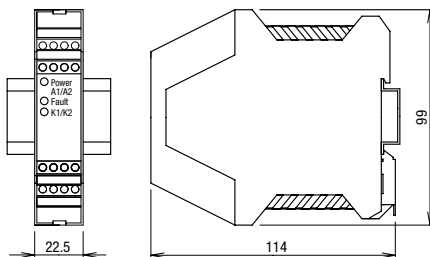
Specifications

Operating Temperature	-10 to +55°C (no freezing)		
Degree of Protection	Terminal: IP20, Housing: IP40		
Rated Power Voltage	24V DC (-20 to +20%)		
Power Consumption	HR1S-DMB: 2.5W maximum (24V DC) HR1S-DME: 3.5W maximum (24V DC)		
Overcurrent Protection	Electronic		
Control Circuit Voltage	24V DC		
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	20 ms maximum		
Input Synchronization Time	500 ms (between two non-contact interlock switches)		
Overvoltage Category	III		
Pollution Degree	2		
Rated Insulation Voltage	300V		
Maximum Input Resistance	100Ω (per input point)		
No. of Outputs	Safety Circuit	2NO	
	Time Delay Circuit	—	
Auxiliary Circuit	Contact Transistor	—	
	Safety Circuit	2NO	
Output Contact Ratings	Safety Circuit	AC-15	C300 (Ue = 230V AC / Ie = 0.75A)
		DC-13	Ue = 24V DC / Ie = 1.5A
	Time Delay Circuit	AC-15	—
		DC-13	—
	Auxiliary Circuit	AC-15	—
		DC-13	—
Transistor Circuit	24V/20 mA	—	
Minimum Applicable Load	17V/10 mA (initial value)	—	
Operation Frequency	1200 operations/hour maximum	—	
Rated Current	Output total 12A maximum	—	
Wire Size	HR1S-DMB1132:	0.14 to 2.5mm ²	—
	HR1S-DME1132:	0.2 to 2.5mm ²	—
	HR1S-DMB1132P:	0.2 to 2.5mm ²	—
	HR1S-DME1132P:	0.2 to 2.5mm ²	—
Weight	HR1S-DMB: 180g HR1S-DME: 250g	—	

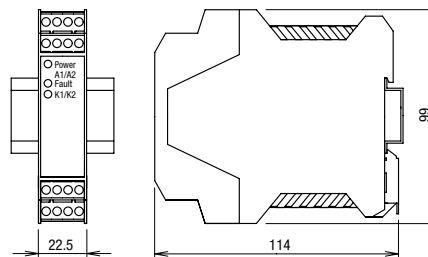
- Use a 4A fuse (Type gL) for power fuse protection.
- Use a 4A (Type gL) or a 6A fast blow fuse for output fuse protection.

Dimensions

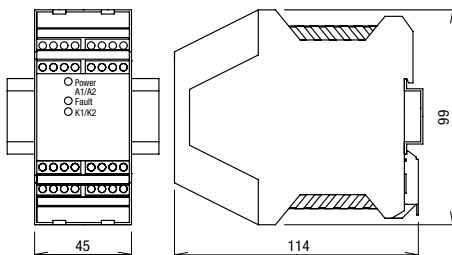
HR1S-DMB1132



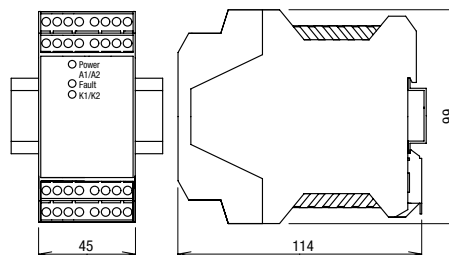
HR1S-DMB1132P



HR1S-DME1132



HR1S-DME1132P



All dimensions in mm.

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E-102

- APEM
- Switches & Pilot Lights
- Control Boxes
- Emergency Stop Switches
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- Safety Light Curtains
- Safety Modules

HS7A

HR1S

HS3A

HR1S Series Safety Relay Modules for Non-contact Interlock Switches

LED Indication

HR1S-DMB

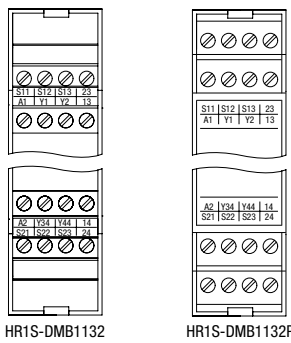
- Power A1/A2:
Turns on when power circuit is normal.
Turns off when power is interrupted or the electronic fuse blows.
- Fault:
Turns on when the HR1S fails
(see Causes of Fault LED Indication on **E-104**).
- K1/K2:
Turns on when K1/K2 relays operate.

HR1S-DME

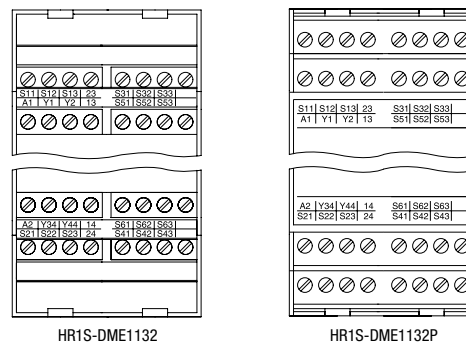
- Power A1/A2:
Turns on when power circuit is normal.
Turns off when power is interrupted or the electronic fuse blows.
- Fault:
Turns on when the HR1S fails
(see Causes of Fault LED Indication on **E-104**).
- K1/K2:
Turns on when K1/K2 relays operate.
- S13: NO contact of non-contact interlock switch 1
- S12: NC contact of non-contact interlock switch 1
- S23: NO contact of non-contact interlock switch 2
- S22: NC contact of non-contact interlock switch 2
- S33: NO contact of non-contact interlock switch 3
- S32: NC contact of non-contact interlock switch 3
- S43: NO contact of non-contact interlock switch 4
- S42: NC contact of non-contact interlock switch 4
- S53: NO contact of non-contact interlock switch 5
- S52: NC contact of non-contact interlock switch 5
- S63: NO contact of non-contact interlock switch 6
- S62: NC contact of non-contact interlock switch 6

Terminal Arrangement

HR1S-DMB

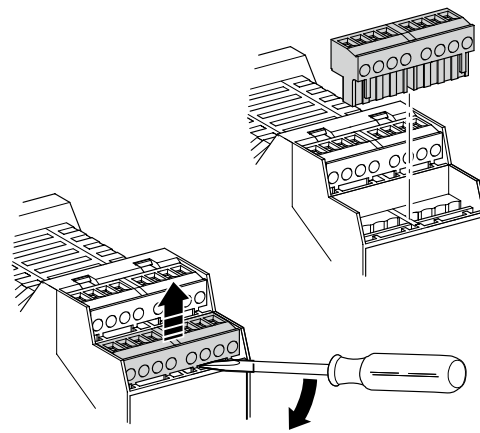
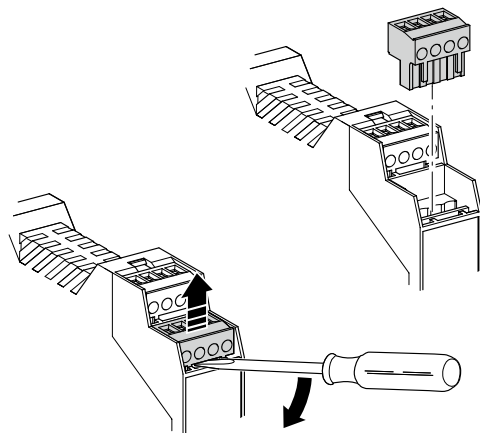


HR1S-DME



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

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



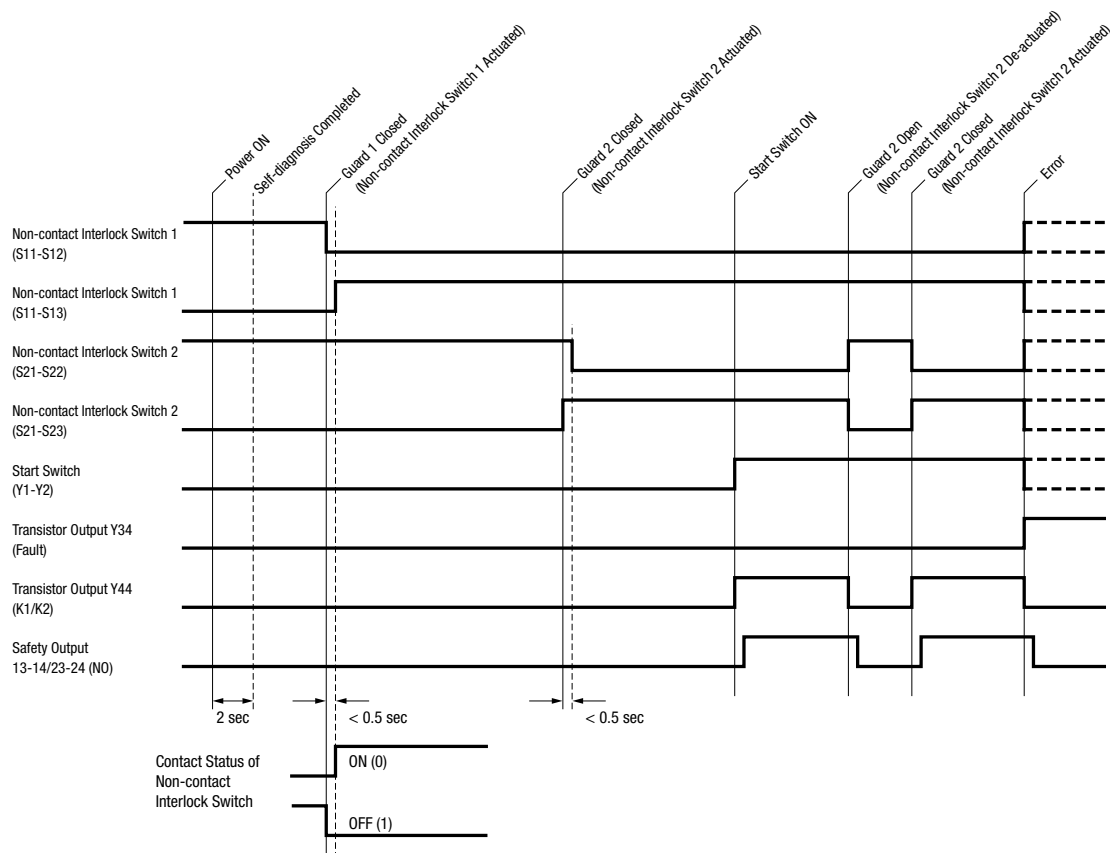
HR1S Series Safety Relay Modules for Non-contact Interlock Switches

Causes of Fault LED Indication

LED2: Fault	Fault Type	Fault Cause	Measures
	Internal Fault	Fault of the internal circuit	Replace the safety relay module.
	External Fault	Short circuit of the +24V power supply and input terminal	Remove the short circuit and reboot.
	External Fault	Short-circuit of the non-contact interlock switch wiring	Correct the wiring of the non-contact interlock switch and reboot.
	Synchronization time excess of switch contact input	Synchronization for the NO contact and NC contact of the non-contact interlock switch (HS7A) is 0.5 seconds or longer.	Open and close the door again.
		Fault of the non-contact interlock switch (HS7A)	Replace the non-contact interlock switch.

- External fault: 1-sec ON, 1-sec OFF
- Synchronization time excess: 30-sec ON, 30-sec OFF

HR1S-DMB/HR1S-DME Safety Relay Module Operation Chart



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- HR1S
- HS3A

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HR1S Series Safety Relay Modules for Non-contact Interlock Switches

HR1S-AF

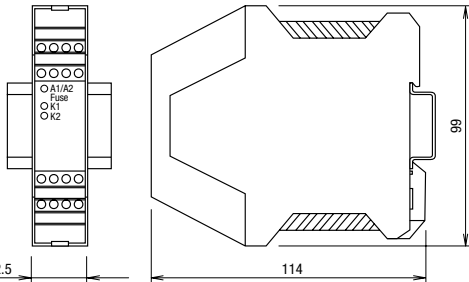


Part No.	Voltage	Terminal Style	Number of Input
HR1S-AF5130B	24V AC -15 to +10% 50/60Hz	Integrated terminal block	1
HR1S-AF5130PB	24V DC -15 to +10%	Removable terminal block	

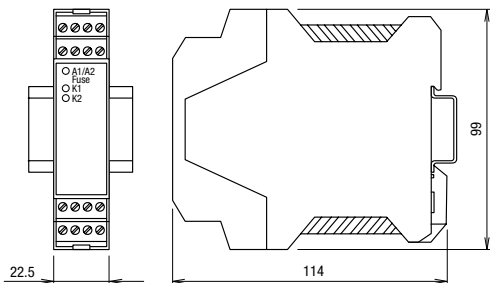
- Package quantity: 1
- For the maximum number of connectable non-contact interlock switches, see HS7A-DMC (E-095) and HS7A-DMP (E-099) pages of the catalog.

Dimensions

HR1S-AF5130B



HR1S-AF5130PB Detachable Terminal



All dimensions in mm.

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	5VA maximum		
Overcurrent Protection	Electronic (Note)		
Control Circuit Voltage	24V DC		
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	S11-S12, S21-S22 interrupted: 20 ms Power interrupted: 60 ms		
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 Circuit	Contact Transistor
Output Contact Ratings	Safety Circuit	AC-15	C300 (1800VA/180VA)
		DC-13	24V/1.5A, L/R = 50 ms
	Time Delay Circuit	AC-15	-
		DC-13	-
	Auxiliary Circuit	AC-15	-
		DC-13	-
Transistor Circuit	-		
Minimum Applicable Load	17V/10 mA (initial value)		
Operation Frequency	1200 operations/hour maximum		
Rated Current	Safety circuit output total: 18A maximum Each safety circuit output: 6A maximum		
Wire Size	HR1S-AF5130B: 1 × 2.5mm, 2 × 0.75mm maximum		
	HR1S-AF5130PB: 1 × 2.5mm, 2 × 1.5mm maximum		
Weight	250g		

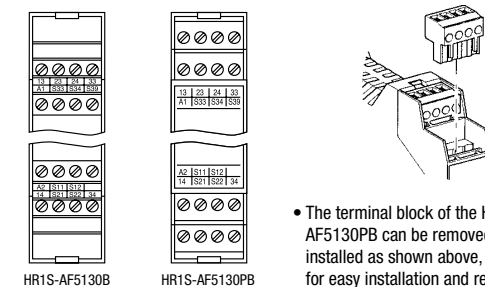
Note: Short-circuit of S11 and S21 activates the overcurrent protection circuit, interrupting the power supply. The safety output turns off. Normal status is restored when the short-circuit is removed.

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

LED Indication

- 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.

Terminal Arrangement



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

HR1S Series Safety Relay Modules for Non-contact Interlock Switches

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.

- When the applicable standards of machine operation are not observed. Or, when machine is not adjusted or maintained properly (observe the maintenance schedule strictly).
- When the contacts of relays and contactors for connecting with safety outputs are not of the forced guide type 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 of the forced guided type 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.

HR1S-DMB/HR1S-DME

- Use 13-14 and 23-24 safety outputs for the safety equipment which constitutes the safety circuit compliant with EN 60204-4/EN418.
- Connect the 13-14 and 23-24 safety outputs in series when turning on/off the hazard source directly in the circuit of safety category 4.
- The safety relay module will perform self diagnosis for two seconds after powering on A1-A2 terminals. During self diagnosis, all LEDs will turn on, and Y34/Y44 outputs turn on.
- Safety outputs turn on when the non-contact interlock switch has been activated and the start input turns on. The safety outputs turn on only when the NO contact of the non-contact interlock switch turns on within 0.5 seconds after the NC contact has turned off.
- Short-circuit the unused inputs according to the wiring diagram.
- Connect a surge absorbing element to the input coil of the relay connected to the safety output.
- Use a 4A fuse (Type gL) or a 6A fast blow fuse for power and output fuse protection.

HR1S-AF

- For stop category 0 compliant with EN 60204-1/EN418, use the outputs of 13-14, 23-24, and 33-34.
- Connect a start switch to S33-S34 to detect contact welding and other failures. Contact welding cannot be detected if the start switch is connected to S33-S39, because the output circuit closes when the start switch closes.

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HS7A

HR1S

HS3A



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