Non-contact Interlock Switches

HS7A Series

Compact and easy positioning.

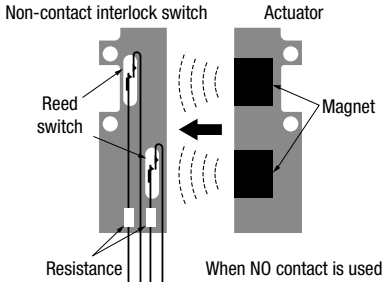
- See website for details on approvals and standards.

* Non-contact interlock switches can be used as a 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

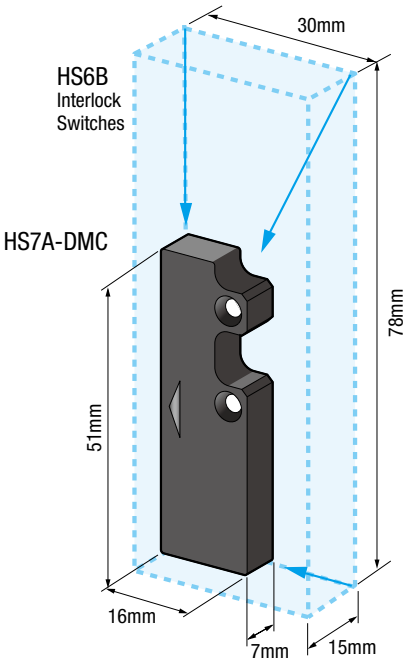
Operating principle (Reed switch)

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 acheived.

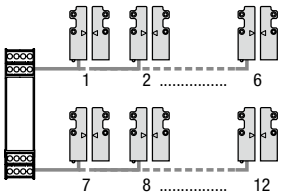
HR1S-DMB HR1S-DME

IP67

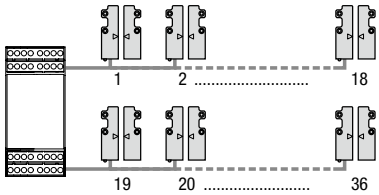
Because the reed switch is filled with plastic, the switches have strong dust and waterproof characteristics and can be washed with water.

Connects up to 36 units

HR1S-DMB Can connect up to 12 units



HR1S-DME Can onnect up to 36 units

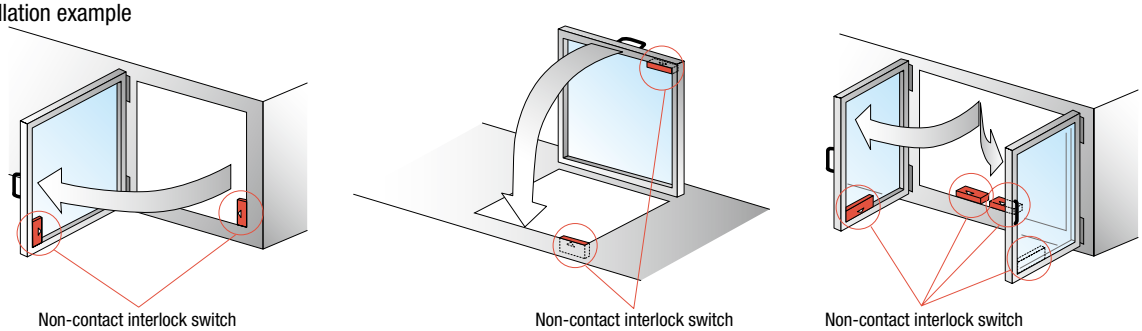


- Safety category 3 can be achieved when connecting two or more non-contact interlock switches per one input.
- Safety category 4 can be achieved when connecting one non-contact interlock switches per one input.
- The maximum number of units that can be connected differs depending on the existence of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

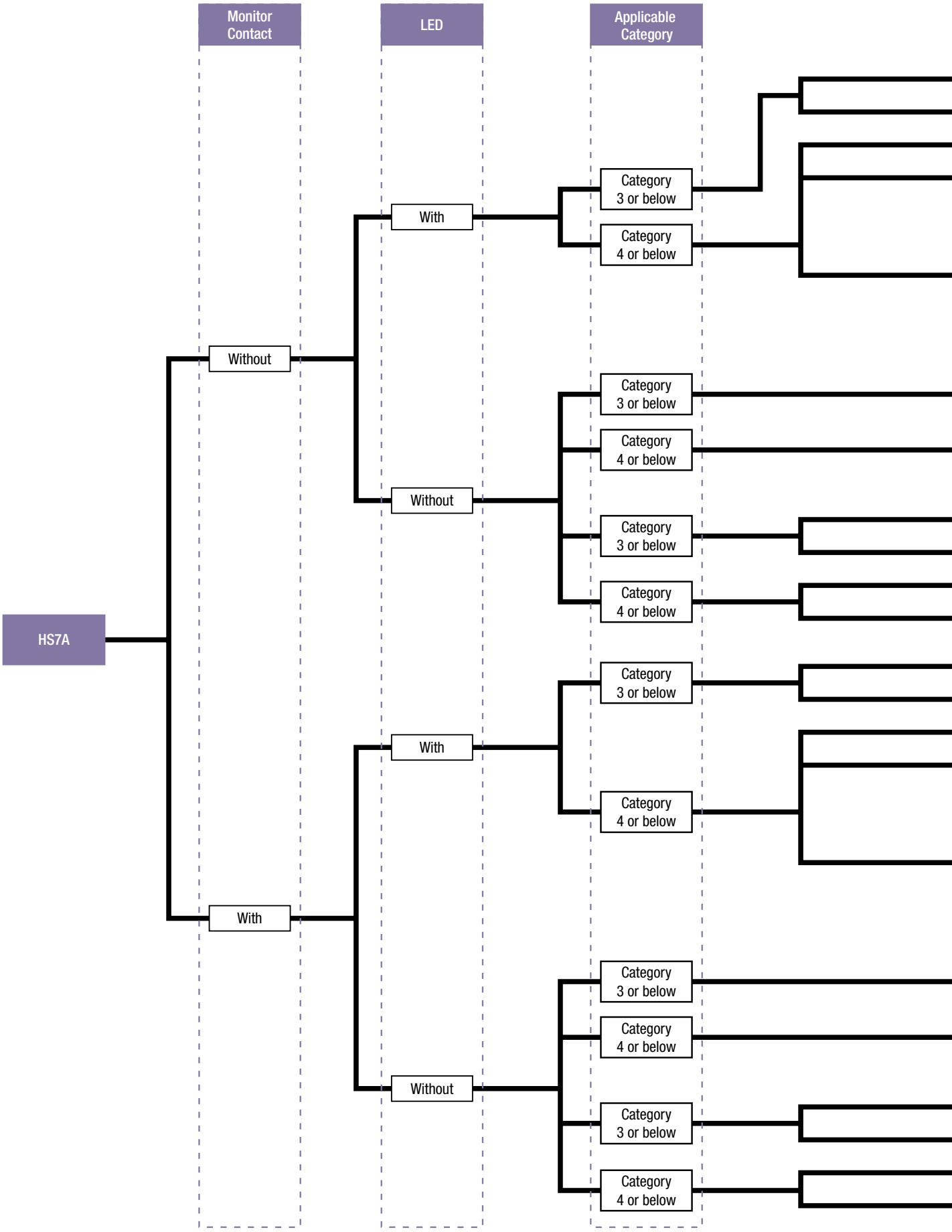
Requirements for using the non-contact interlock switches correctly

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 exlusive safety relay module.

Installation example



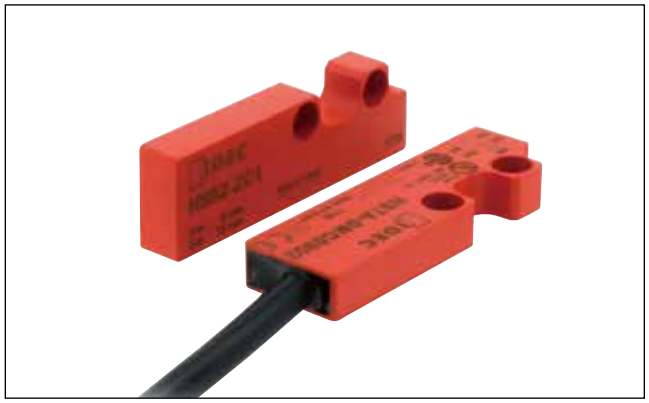
HS7A Non-contact Interlock Switches



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

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	
	10m	Without	HS7A-DMC59010	
		With	HS7A-DMC59110	
2NO	2m	Without	HS7A-DMC7902	HR1S-AF5130B HR1S-AF5130PB
		With	HS7A-DMC7912	
	5m	Without	HS7A-DMC7905	
		With	HS7A-DMC7915	
	10m	Without	HS7A-DMC79010	
		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.

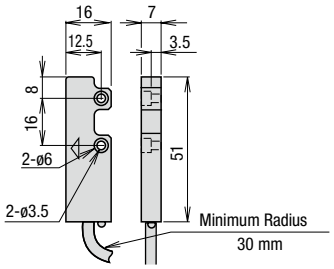
Specifications

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/s² (11 ms) (IEC 60068-2-7)
Vibration Resistance		100 m/s² (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 mm²) × 4 Cable length: 2m, 5m, 10m
Weight (approx.)		HS7A-DMC: 100g (cable length: 2m) HS9Z-ZC1: 9g

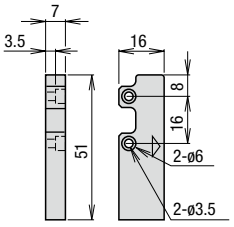
• See E-105 for specifications on HR1S-AF safety relay modules

Dimensions

HS7A-DMC (Non-contact Interlock Switch)



HS9Z-ZC1 (Actuator)

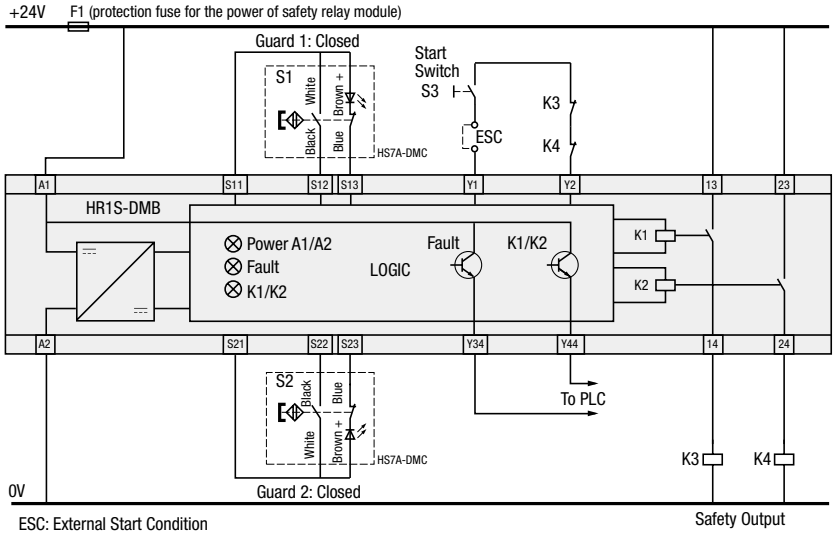


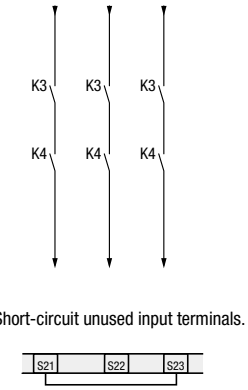
All dimensions in mm.

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.

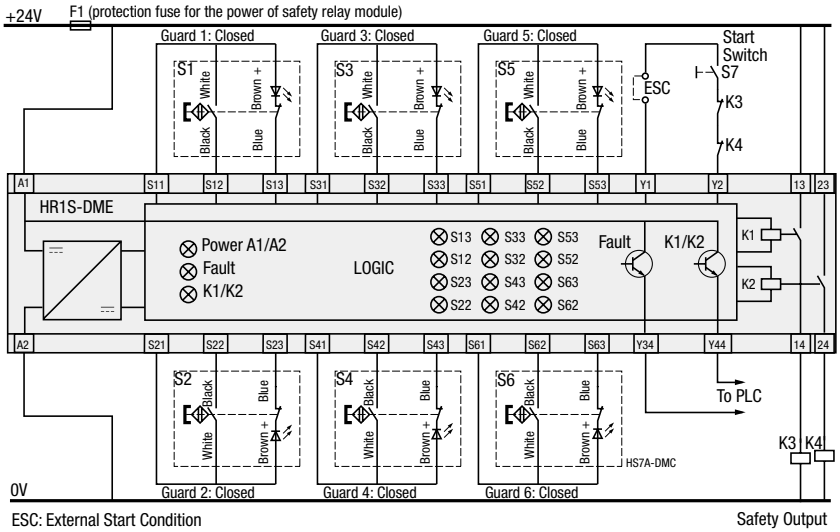
When using HR1S-DMB + HS7A-DMC591☐ (1NO+1NC) + HS9Z-ZC1

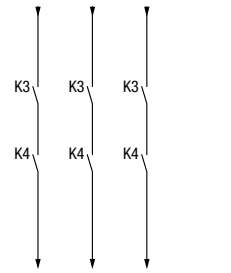




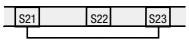
Short-circuit unused input terminals.

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

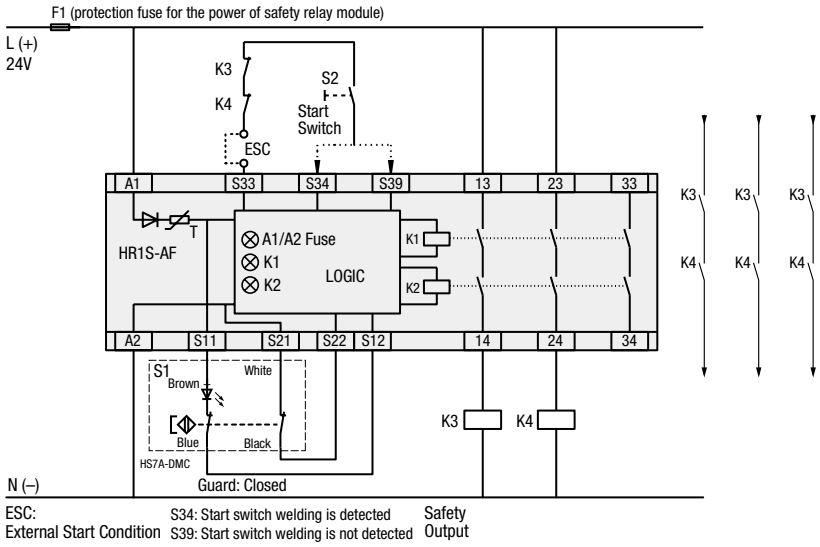




Short-circuit unused input terminals.



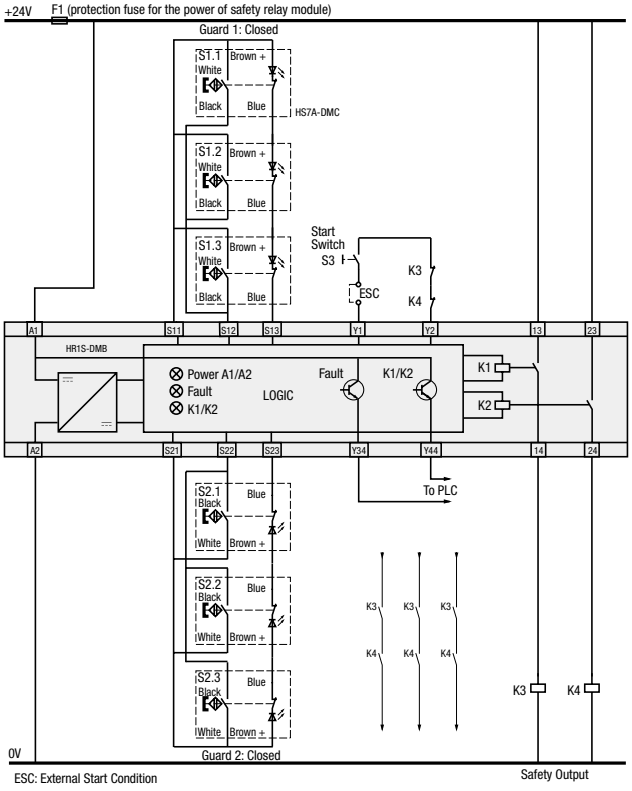
When using HR1S-AF5130B/AF5130PB + HS7A-DMC791☐ (2NO) + HS9Z-ZC1 (Note)



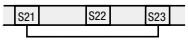
HS7A-DMC Non-contact Interlock Switches

Below are examples of wiring diagrams.

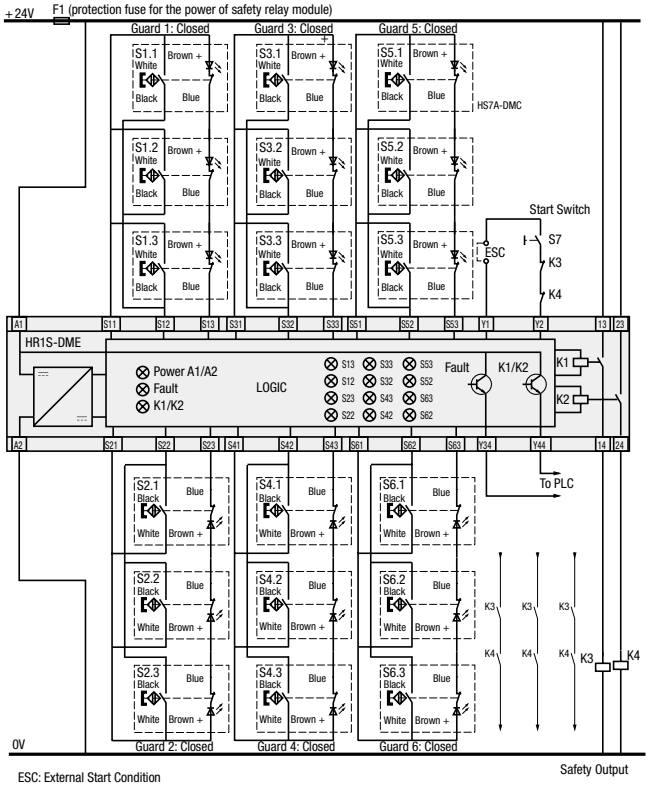
When using HR1S-DMB + HS7A-DMC591☐ (1NO+1NC) + HS9Z-ZC1



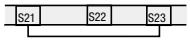
Short-circuit unused input terminals.



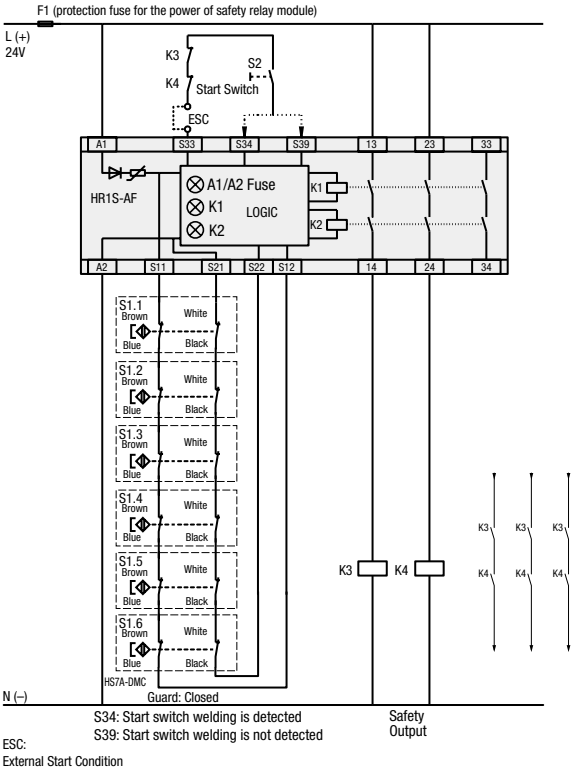
When using HR1S-DME + HS7A-DMC591☐ (1NO+1NC) + HS9Z-ZC1



Short-circuit unused input terminals.



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



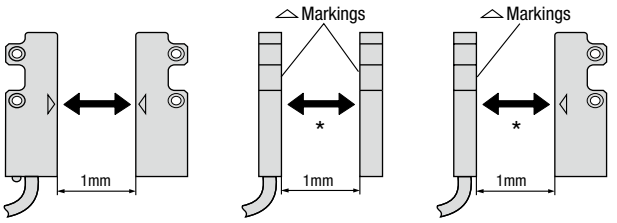
Safety Precautions

- 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/s^2 (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.

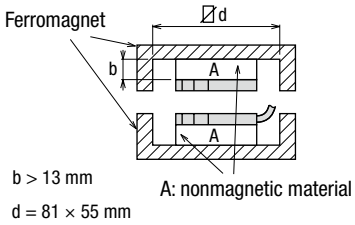
Operating Direction



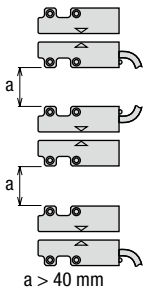
* Safety output ON distance (Sao): 4 mm

Precautions for Installation

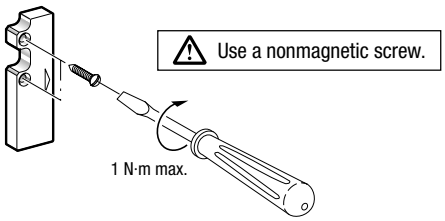
When installing on a ferromagnet



Close mounting

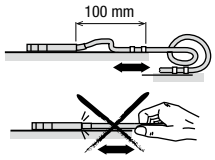


Tightening Torque



Precaution for Cable Wiring

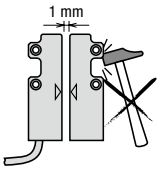
Tensile force on the cable may cause disconnection. Be sure to secure the cable near the non-contact interlock switches.



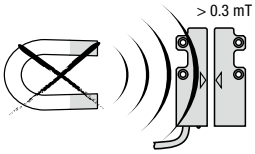
Precautions for Mounting the Actuator

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.

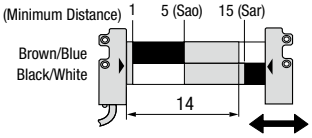


Do not use the non-contact interlock switch in a magnetic field of 0.3 mT or over.

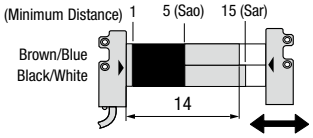


Operation Chart

HS7A-DMC59 □□(1NO+1NC)



HS7A-DMC79 □□(2NO)



Dimensions: mm

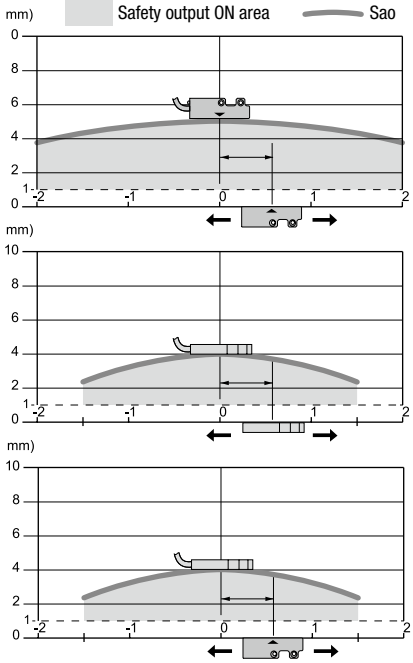
Contact Status

■	Contact Closed (1)
□	Contact Open (0)
▒	Transient State

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



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

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 HR1S-DME1132 HR1S-DME1132P
		With	HS7A-DMP5012	
	5m	Without	HS7A-DMP5005	
		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	2	12
HR1S-DMB1132P		
HR1S-DME1132	6	36
HR1S-DME1132P		
HR1S-AF5130B	1	6
HR1S-AF5130PB		

- 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.

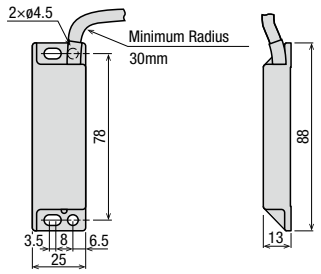
Specifications

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/s² (11 ms) (IEC 60068-2-7)
Vibration Resistance		100 m/s² (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 mm²) × 6 Cable length: 2m, 5m
Weight (approx.)		HS7A-DMP: 180g (cable length: 2 m) HS9Z-ZP1: 50g

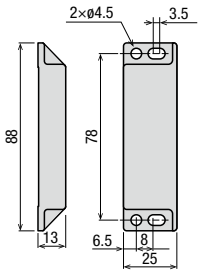
- For specifications on safety relay modules, see HR1S-DMB/DME (E-102) and HR1S-AF (E-105) of the catalog.

Dimensions

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



HS9Z-ZP1 (Actuator)

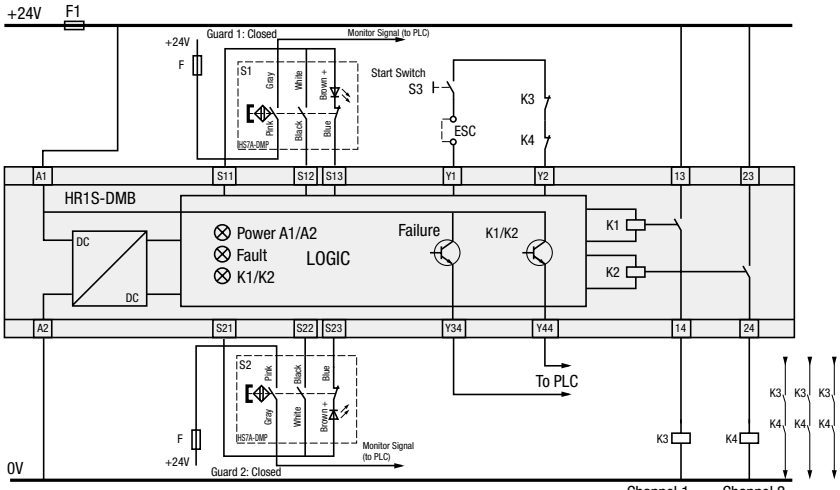


All dimensions in mm.

Wiring Diagram

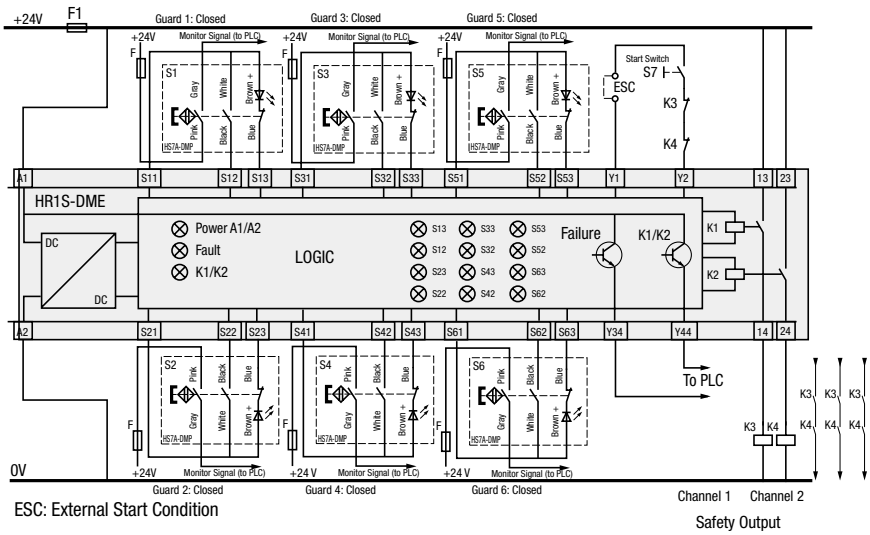
⚠ The following diagrams show the contact statuses when the non-contact interlock switches are activated by the actuators.
Below are examples of wiring diagrams.

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



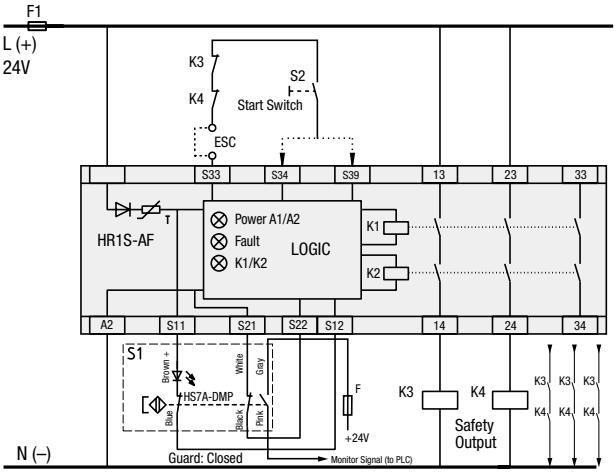
ESC: External Start Condition

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



ESC: External Start Condition

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))

ESC: External Start Condition
S34: Start switch welding is detected
S39: Start switch welding is not detected

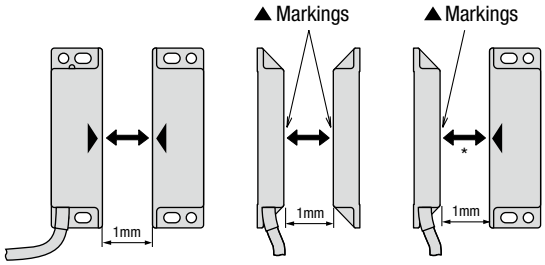
Safety Precautions

- 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/s^2 (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.

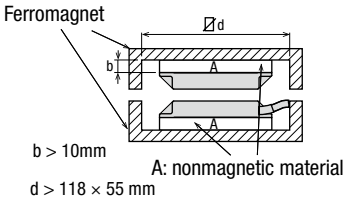
Operating Direction



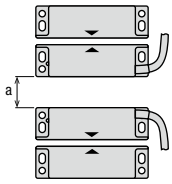
Safety output ON distance (Sao): 4 mm

Precautions for Installation

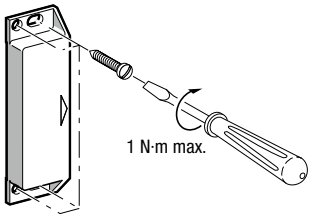
When installing on a ferromagnet



Close mounting



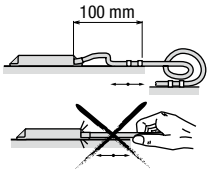
Tightening Torque



⚠ Use a nonmagnetic screw.

Precaution for Cable Wiring

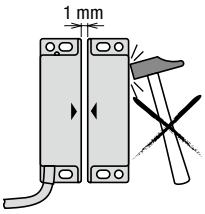
⚠ Tensile force on the cable may cause disconnection. Be sure to secure the cable near the non-contact interlock switch.



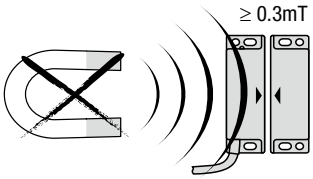
Precautions for Mounting Actuator

⚠ 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.

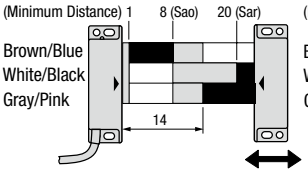


⚠ Do not use the non-contact interlock switch in a magnetic field of 0.3 mT or over.

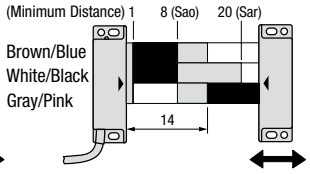


Operation Chart

HS7A-DMP50□□ (1NO+2NC)



HS7A-DMP70□□ (2NO+1NC)



Dimensions: mm

Contact Status

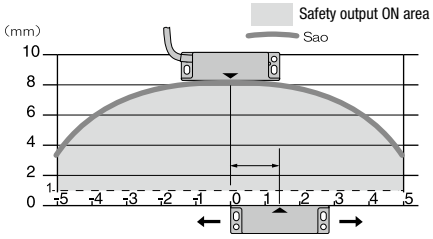
■	Contact closed (1)
□	Contact open (0)
▒	Transient area

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.

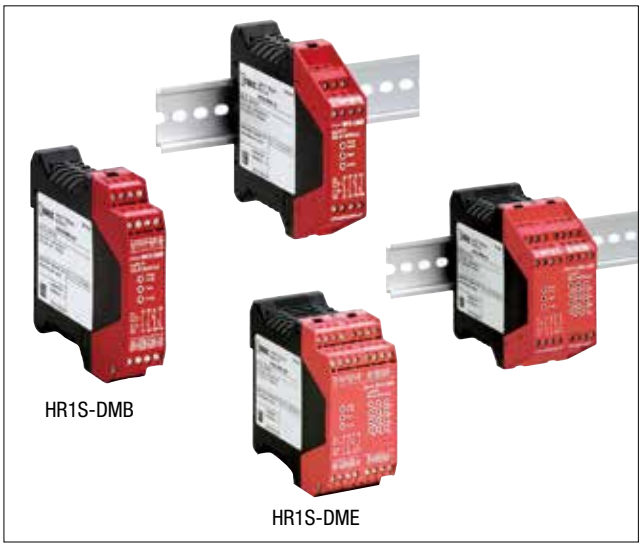
Operation Area



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

HR1S Series Safety Relay Modules for Non-contact Interlock Switches

HR1S-DMB/HR1S-DME



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

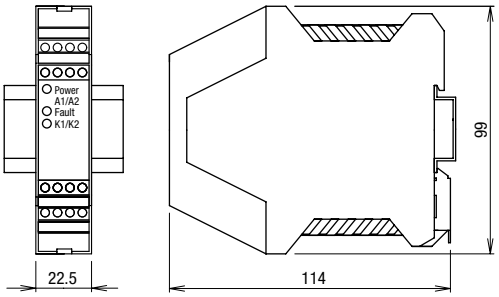
Specifications

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	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 2.5mm² HR1S-DME1132: 0.2 to 2.5mm² HR1S-DMB1132P: 0.2 to 2.5mm² HR1S-DME1132P: 0.2 to 2.5mm²
Weight			HR1S-DMB: 180g HR1S-DME: 250g

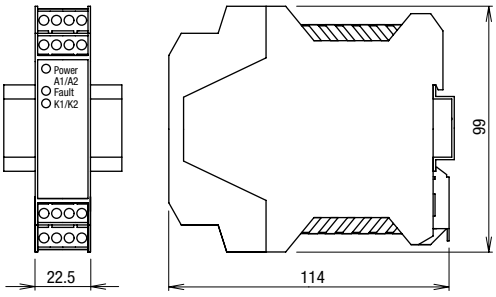
- Use a 4A fuse (Type gL) for power fuse protection.
- Use a 4A (Type gL) or a 6A fast blow fuse for output fuse protection.

Dimensions

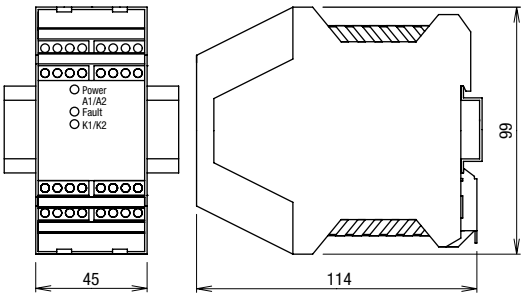
HR1S-DMB1132



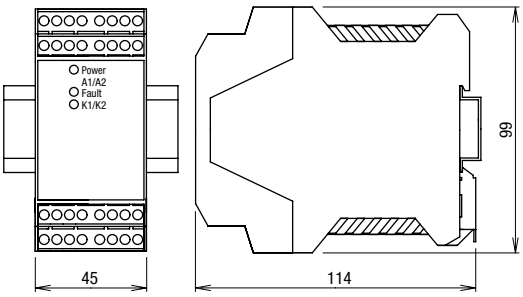
HR1S-DMB1132P



HR1S-DME1132



HR1S-DME1132P



All dimensions in mm.

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

LED Indication

HR1S-DMB

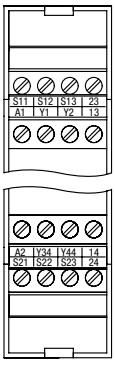
- Power A1/A2:
  Turns on when power circuit is normal.
  Turns off when power is interrupted or the electronic fuse blows.
- Fault:
  Turns on when the HR1S fails
  (see Causes of Fault LED Indication on E-104).
- K1/K2:
  Turns on when K1/K2 relays operate.

HR1S-DME

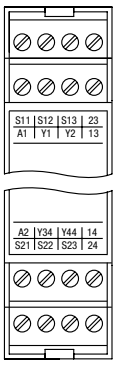
- Power A1/A2:
  Turns on when power circuit is normal.
  Turns off when power is interrupted or the electronic fuse blows.
- Fault:
  Turns on when the HR1S fails
  (see Causes of Fault LED Indication on E-104)
- K1/K2:
  Turns on when K1/K2 relays operate.
- S13: NO contact of non-contact interlock 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

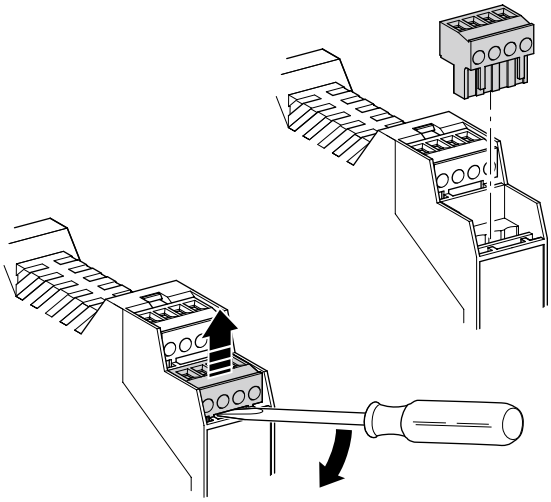


HR1S-DMB1132

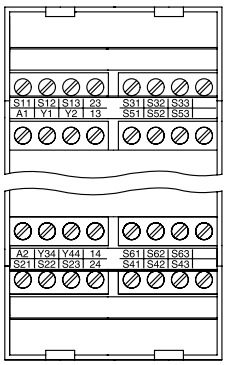


HR1S-DMB1132P

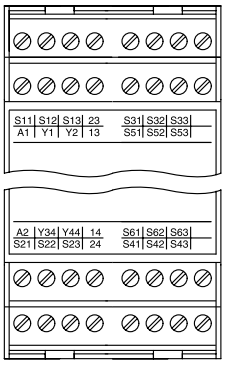
- The terminal block of the HR1S-DMB□□□□P can be removed and installed as shown below, allowing for easy installation and replacement of modules.



HR1S-DME

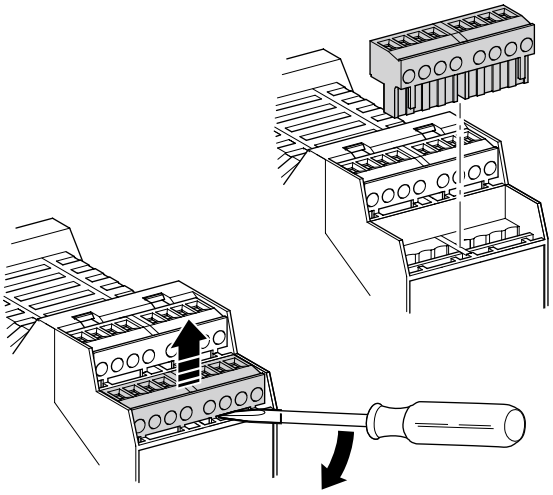


HR1S-DME1132



HR1S-DME1132P

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

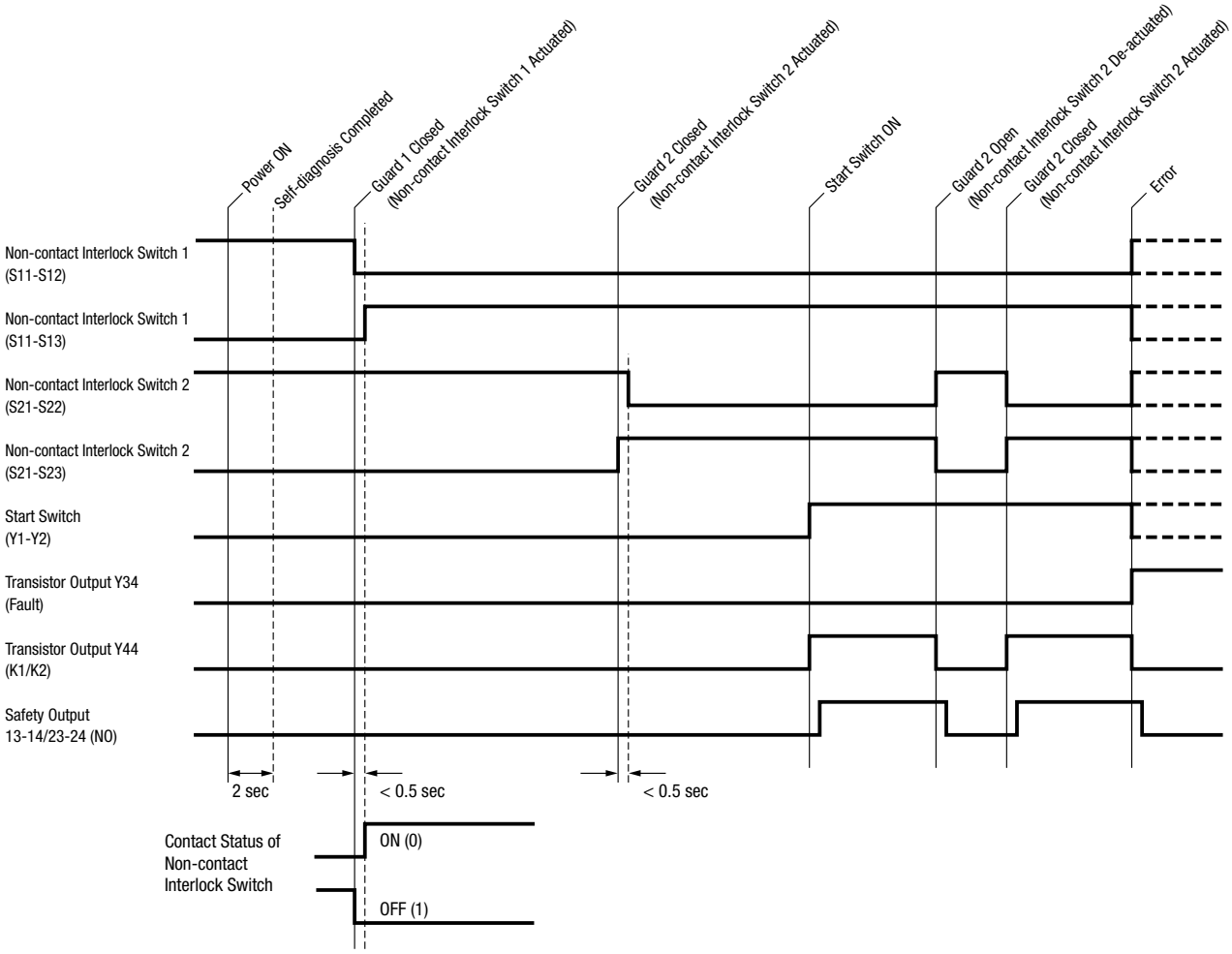


Causes of Fault LED Indication

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



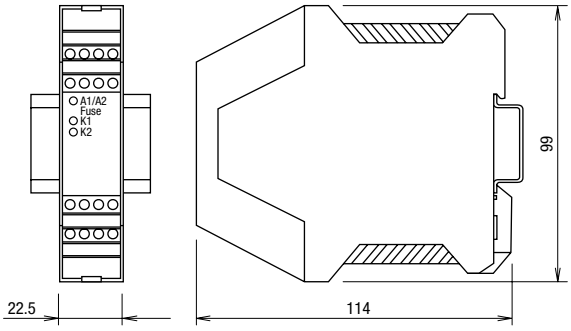
HR1S-AF

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

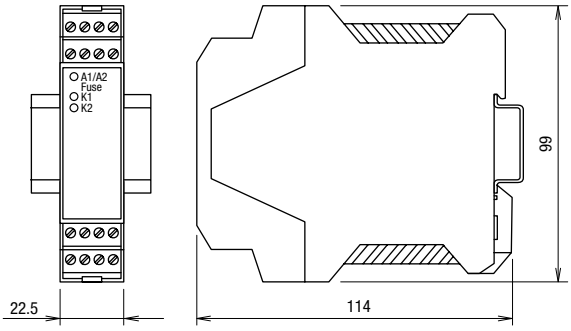
- Package quantity: 1
- For the maximum number of connectable non-contact interlock switches, see HS7A-DMC (E-095) and HS7A-DMP (E-099) pages of the catalog.

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

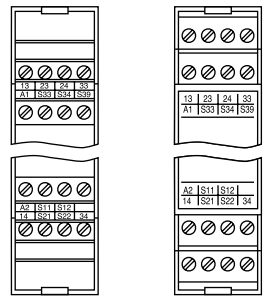
Note: Short-circuit of S11 and S21 activates the overcurrent protection circuit, interrupting the power supply. The safety output turns off. Normal status is restored when the short-circuit is removed.

- 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.

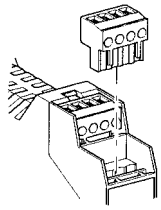
LED Indication

- 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



HR1S-AF5130B HR1S-AF5130PB



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