

HR6S-AT Safety Relay Module

Equipped with time delay output for stop category 0 and stop category 1

- Protects both the operator and the machine by immediately stopping dangerous movements (stop category 0) when instructed to stop by the operator or when a failure in the safety circuit is detected. Also, the safety module is equipped with a stop category 1 delay output, which allows the motor to stop after deceleration.
- The selector on the front can be used to set the delay time to a value from 0.1 seconds to 15 minutes. (Can also be set to 0 seconds.)
- The delay output can be canceled by the S21-S22 or S31-S32 terminal (vacant terminal), and the delay output is immediately cut off when canceled.



Output expansion possible

*Available in February 2021.

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Package Quantity: 1

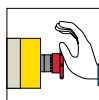
Terminal	Part No.	Supply Voltage
Push-in terminal	HR6S-AT1C	24V AC/DC
Screw terminal (available only on request)	HR6S-AT1P	24V AC/DC

- One sealing strip (see page 26) is included with each product.



- See website for details on approvals and standards.

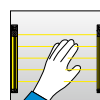
Overview of Application Functions



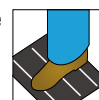
Monitoring of Emergency Stop circuits as per ISO 13850 and IEC 60204-1, stop category 0, 1



Monitoring of guards as per ISO 14119/14120 with coded magnetic switches



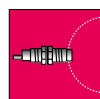
Monitoring of electro-sensitive protective equipment such as type 4 light curtains as per IEC 61496-1



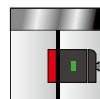
Monitoring of pressure-sensitive 4-wire protective devices such as mats or edges as per ISO 13856



Monitoring of guards as per ISO 14119/14120 with interlock switches



Monitoring of proximity switches



Monitoring of RFID sensors

Safety-Related Outputs

Number of relay contacts, Normally Open, instantaneous	3
Number of relay contacts, Normally Open, delayed	3
Number of relay contacts, Normally Closed, delayed	1
Maximum short circuit current I _K	1 kA
Maximum continuous current, Normally Open relay contacts	6 A
Maximum continuous current, Normally Closed relay contacts	3 A
Maximum total thermal current ΣI_{THERM}	16 A
Minimum current	10 mA
Utilization category as per UL 60947-5-1	B300 and R300 for Normally Open contacts D300 and R300 for Normally Closed contacts
Utilization category as per IEC 60947-4-1 and IEC 60947-5-1	AC-1: 250 V AC-15: 250 V DC-1: 24 V DC-13: 24 V
Maximum current, normally open relay contacts	AC-1: 5 A AC-15: 3 A DC-1: 5 A DC-13: 3 A
Maximum current, normally closed relay contacts	AC-1: 3 A AC-15: 1 A DC-1: 3 A DC-13: 1 A
External fusing	10 A, category gG, for Normally Open 4 A, category gG, for Normally Closed

Delay Times for Delay Function of Safety-Related Outputs

Possible values	0 s, 0.1 s, 0.2 s, 0.3 s, 0.4 s, 0.5 s, 0.6 s, 0.7 s, 0.8 s, 0.9 s, 1 s, 2 s, 3 s, 4 s, 5 s, 6 s, 7 s, 8 s, 9 s, 10 s, 20 s, 30 s, 40 s, 50 s, 60 s, 70 s, 80 s, 90 s, 100 s, 200 s, 300 s, 400 s, 500 s, 600 s, 700 s, 800 s, 900 s
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Additional Non-Safety-Related Outputs

Output voltage	24 VDC
Maximum current	20 mA

Synchronization Times

The synchronization times for the synchronization of safety-related inputs depend on the application function. (See page 16 Function Mode Selector and Input Device Connection Example.)

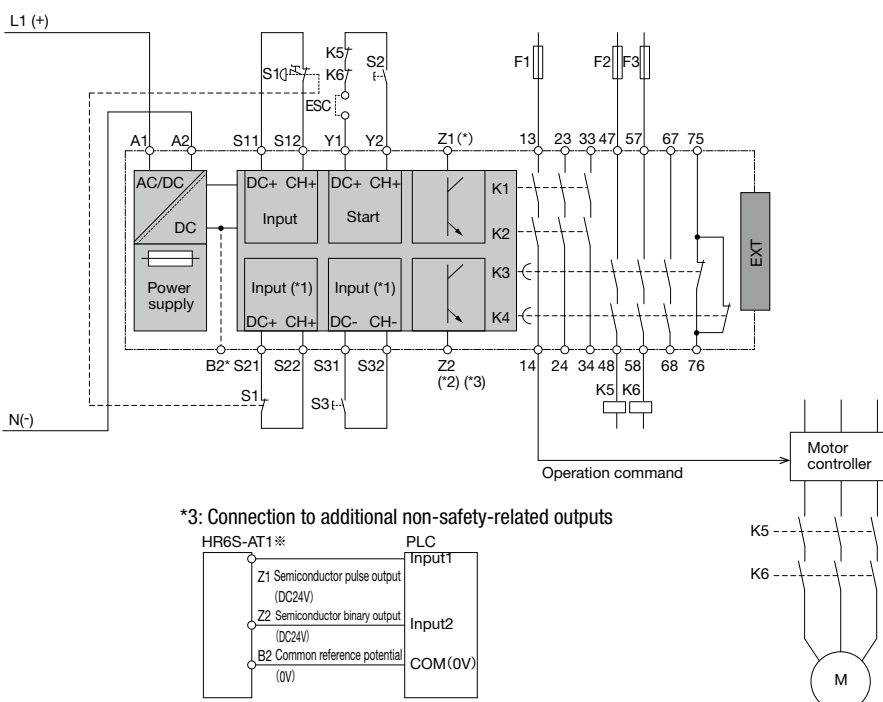
HR6S-AT

Data Functional Safety

Defined safe state		Safety-related outputs are de-energized Normally Open: open Normally Closed: closed
Maximum Performance Level (PL), Category (as per ISO 13849-1:2015)		Normally Open: PL _e , Category 4 Normally Closed: PL _c , Category 1
Maximum Safety Integrity Level (SIL) (as per IEC 61508-1:2010)		Normally Open: 3 Normally Closed: 1
Safety Integrity Level Claim Limit (SILCL) (as per IEC 62061:2005+AMD1:2012+AMD2:2015)		Normally Open: 3 Normally Closed: 1
Type (as per IEC 61508-2)		B
Hardware Fault Tolerance (HFT) (as per IEC 61508 and IEC 62061)		1
Stop Category for Emergency Stops (as per ISO 13850 and IEC 60204-1)		0 or 1
Lifetime in years at an ambient temperature of 55 °C (131 °F)		20
Safe Failure Fraction (SFF) (as per IEC 61508 and IEC 62061)		>99 %
Probability of Dangerous Failure per hour (PFH _D) in 1/h (as per IEC 61508 and ISO 13849-1)		0.94 × 10 ⁻⁹ for Stop Category 0 0.95 × 10 ⁻⁹ for Stop Category 1
Mean Time To Dangerous Failure (MTTF _D) in years (high as per ISO 13849-1)		>30
Average Diagnostic Coverage (DC _{avg}) (high as per ISO 13849-1)		≥99 %
Maximum number of cycles over lifetime	DC-13	24 VDC 1 A: 1200000 with Stop Category 0
		24 VDC 1 A: 1200000 with Stop Category 1
		24 VDC 3 A: 180000 with Stop Category 0
		24 VDC 3 A: 275000 with Stop Category 1
	AC-1	250 VAC 4 A: 180000 with Stop Category 0
		250 VAC 4 A: 90000 with Stop Category 1
	AC-15	250 VAC 1 A: 70000 with Stop Category 0
		250 VAC 1 A: 90000 with Stop Category 1
250 VAC 5 A: 28000 with Stop Category 0		
250 VAC 5 A: 50000 with Stop Category 1		

For other specifications (common to all models), see [page 25](#).

Wiring Example

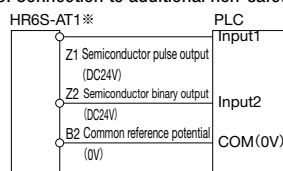


Designation	Explanation
EXT	Connector for optional expansion module
S1	Emergency stop switch
S2	Start switch
S3	Off-delay cancel switch
K3, K4	Contactor
PLC	Programmable controller
F1, F2, F3	Fuse

*1: Inputs that are not used for safety device inputs can be used to cancel the delay function for safety-related outputs.







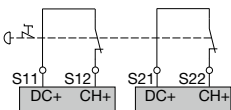
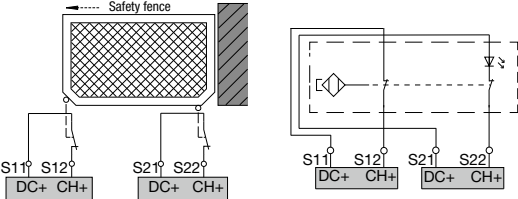
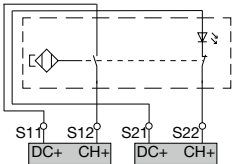


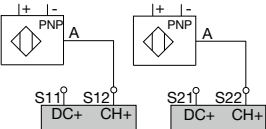
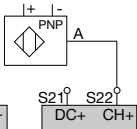
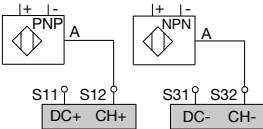

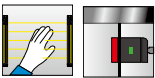
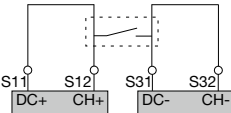
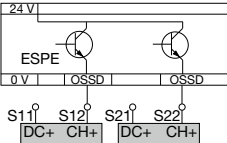
*2: Turns off while a safety-related output is on or when an error is detected.

*3: Connection to additional non-safety-related outputs



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Function Mode Selector and Input Device Connection Example

Dial 1	Dial 2		Dial 3
Synchronous monitoring: No Dynamization: Yes Signal interlock monitoring: Yes	Synchronous monitoring: 2 s / 4 s (S12 first / S22 first) Dynamization: Yes Signal interlock monitoring: Yes		Synchronous monitoring: 0.5 s Dynamization: Yes Signal interlock monitoring: No
 Emergency stop switches	 Interlock switch	 Coded magnetic switch (2 NC) (*2)	 Interlock switch (1 NO, 1 NC)  Coded magnetic switch (2 NO, 1 NC) (*1)  Proximity switch (1 NO, 1 NC)
			
Dial 4	Dial 6	Dial 5	Dial 7
Synchronous monitoring: No Dynamization: No Signal interlock monitoring: Yes	Synchronous monitoring: 0.5 s Dynamization: No Signal interlock monitoring: Yes	Synchronous monitoring: No Dynamization: No Signal interlock monitoring: Yes	Synchronous monitoring: 0.5 s Dynamization: No Signal interlock monitoring: Yes
 2 PNP		 1 PNP + 1 NPN	
			
Dial 8	Dial 9	Dial 10	
Synchronous monitoring: No Dynamization: No Signal interlock monitoring: Yes	Synchronous monitoring: No Dynamization: No Signal interlock monitoring: Yes	Synchronous monitoring: 0.5 s Dynamization: No Signal interlock monitoring: Yes	
 Pressure-sensitive switch	 2 OSSD		
			

*2: Connection examples for coded magnetic switches such as HS7A (IDEC) are also included on the instruction sheet, but certifications are not available.

HR6S-S Safety Relay Module

Monitoring of two hand control devices (IIIA or IIIC)

- Monitors two-hand control devices (IIIA or IIIC) that are required to comply with International Standard ISO 13851.
- IIIC can monitor two-hand pushbuttons for synchronization within 0.5 seconds.
- If one of the two buttons is released during operation, the control sequence is canceled.
- Connects up to two input devices in parallel (except for two-hand control devices (IIIC)). (Outputs are enabled when all inputs are enabled.)



Output expansion possible

HR6S-S

Package Quantity: 1

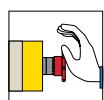
Terminal	Part No.	Supply Voltage
Push-in terminal	HR6S-S1C	24V AC/DC
Screw terminal (available only on request)	HR6S-S1P	24V AC/DC



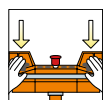
• See website for details on approvals and standards.

- One sealing strip (see page 26) is included with each product.

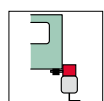
Overview of Application Functions



Monitoring of Emergency Stop circuits as per ISO 13850 and IEC 60204-1, stop category 0



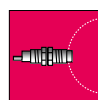
Monitoring of two-hand control devices, type III C as per ISO 13851



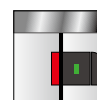
Monitoring of guards as per ISO 14119/14120 with interlock switches



Monitoring of guards as per ISO 14119/14120 with coded magnetic switches



Monitoring of proximity switches



Monitoring of RFID sensors



Monitoring of electro-sensitive protective equipment such as type 4 light curtains as per IEC 61496-1

Safety-Related Outputs

Number of relay contacts, Normally Open, instantaneous	2
Maximum short circuit current I _K	1 kA
Maximum continuous current, Normally Open relay contacts	6 A
Maximum total thermal current ΣI_{THERM}	8 A
Minimum current	10 mA
Utilization category as per UL 60947-5-1	B300 and R300
Utilization category as per IEC 60947-4-1 and IEC 60947-5-1	AC-1: 250 V AC-15: 250 V DC-1: 24 V DC-13: 24 V
Maximum current, normally open relay contacts	AC-1: 5 A AC-15: 3 A DC-1: 5 A DC-13: 3 A
External fusing	10 A, category gG

Additional Non-Safety-Related Outputs

Output voltage	24 VDC
Maximum current	20 mA

Synchronization Times

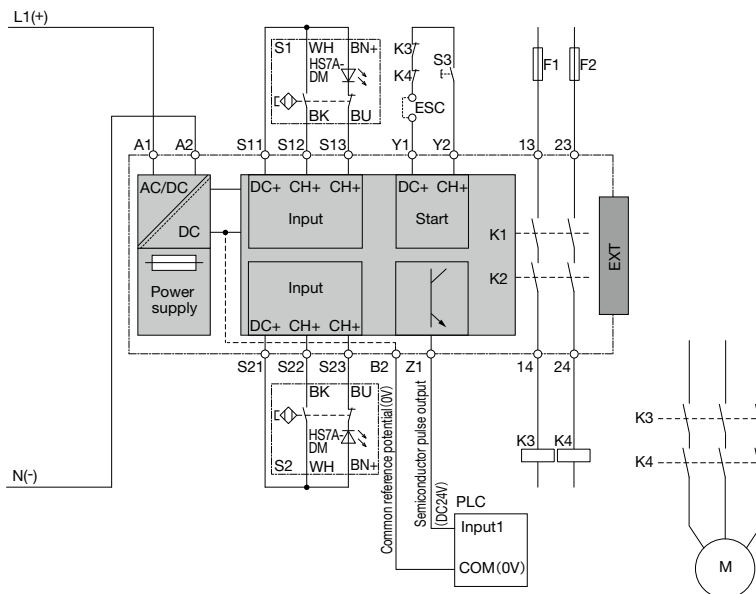
The synchronization times for the synchronization of safety-related inputs depend on the application function. (See page 18 to 19 Function Mode Selector and Input Device Connection Example.)

Data Functional Safety

Defined safe state	Safety-related outputs are de-energized Normally Open: open	
Maximum Performance Level (PL), Category (as per ISO 13849-1:2015)	Normally Open: PLe, Category 4	
Maximum Safety Integrity Level (SIL) (as per IEC 61508-1:2010)	Normally Open: 3	
Safety Integrity Level Claim Limit (SILCL) (as per IEC 62061:2005+AMD1:2012+AMD2:2015)	Normally Open: 3	
Type (as per IEC 61508-2)	B	
Hardware Fault Tolerance (HFT) (as per IEC 61508 and IEC 62061)	1	
Stop Category for Emergency Stops (as per ISO 13850 and IEC 60204-1)	0	
Lifetime in years at an ambient temperature of 55 °C (131 °F)	20	
Safe Failure Fraction (SFF) (as per IEC 61508 and IEC 62061)	>99 %	
Probability of Dangerous Failure per hour (PFH _D) in 1/h (as per IEC 61508 and ISO 13849-1)	1.13 × 10 ⁻⁹	
Mean Time To Dangerous Failure (MTTF _D) in years (high as per ISO 13849-1)	>30	
Average Diagnostic Coverage (DC _{avg}) (high as per ISO 13849-1)	≥99 %	
Maximum number of cycles over lifetime	DC-13	24 VDC 1 A: 1200000 24 VDC 3 A: 180000
	AC-1	250 VAC 4 A: 180000 250 VAC 1 A: 70000
	AC-15	250 VAC 5 A: 28000

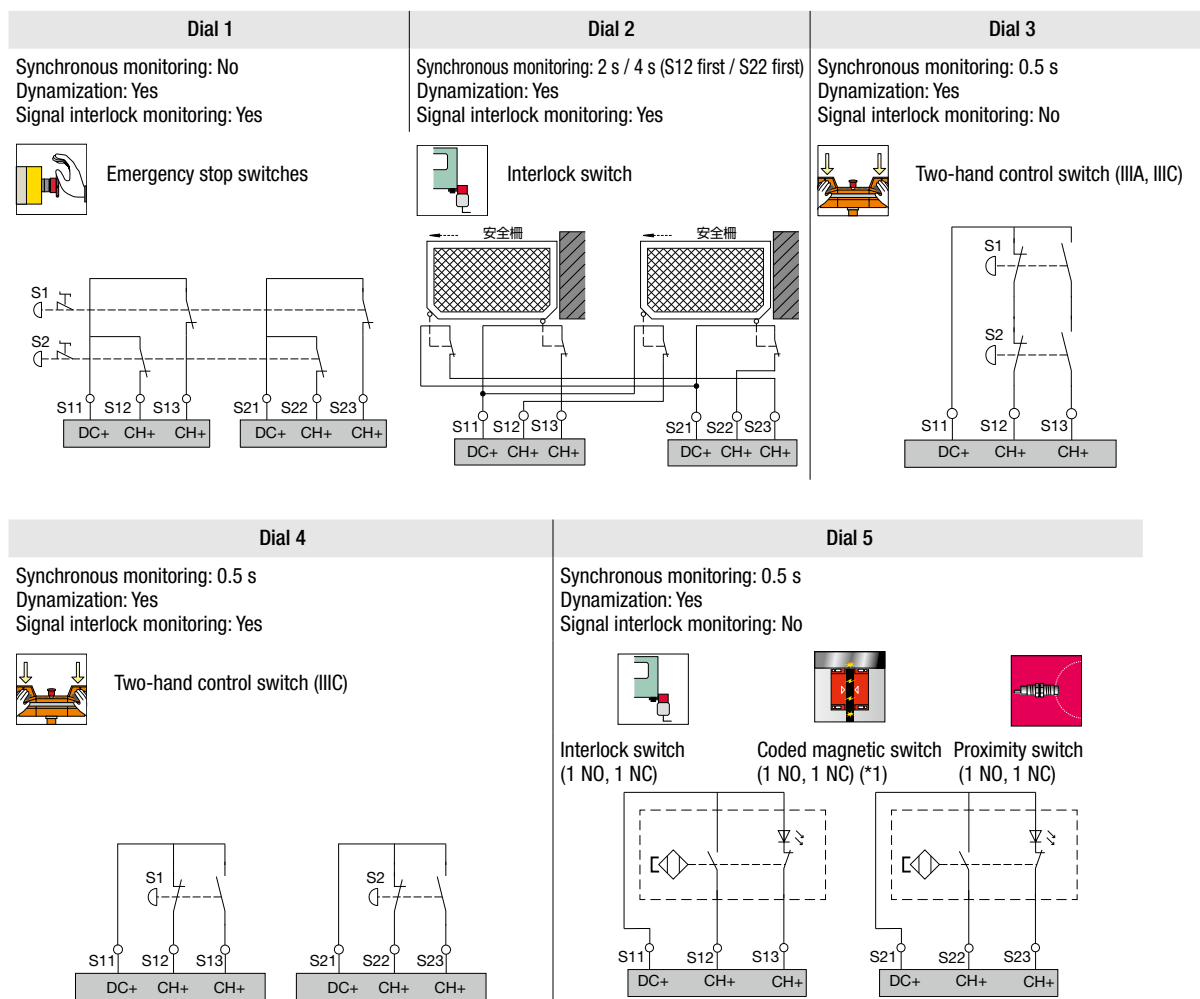
HR6S-S

Wiring Example



Designation	Explanation
EXT	Connector for optional expansion module
S1, S2	Emergency stop switch
S3	Start switch
K3, K4	Contactors
PLC	Programmable controller
F1, F2	Fuse

Function Mode Selector and Input Device Connection Example



*1: Connection examples for coded magnetic switches such as HS7A (IDEC) are also included on the instruction sheet, but certifications are not available.