

# 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.

### HR6S-AT

Package Quantity: 1

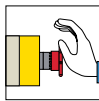
Terminal	Part No.	Supply Voltage
Push-in terminal	HR6S-AT1C	24V AC/DC
Screw terminal	HR6S-AT1P	24V AC/DC

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



• See website for details on approvals and standards.

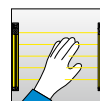
### Overview of Application Functions



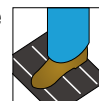
Monitoring of Emergency Stop circuits as per ISO 13850 and IEC 60204-1, stop category 0, 1



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



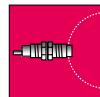
Monitoring of electro-sensitive protective equipment such as type 4 light curtains as per IEC 61496-1



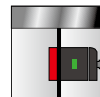
Monitoring of pressure-sensitive 4-wire protective devices such as mats or edges as per ISO 13856



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 IK	1 kA
Maximum continuous current, Normally Open relay contacts	6 A
Maximum continuous current, Normally Closed relay contacts	3 A
Maximum total thermal current $\Sigma I_{THERM}$	12 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	24V DC
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.)

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

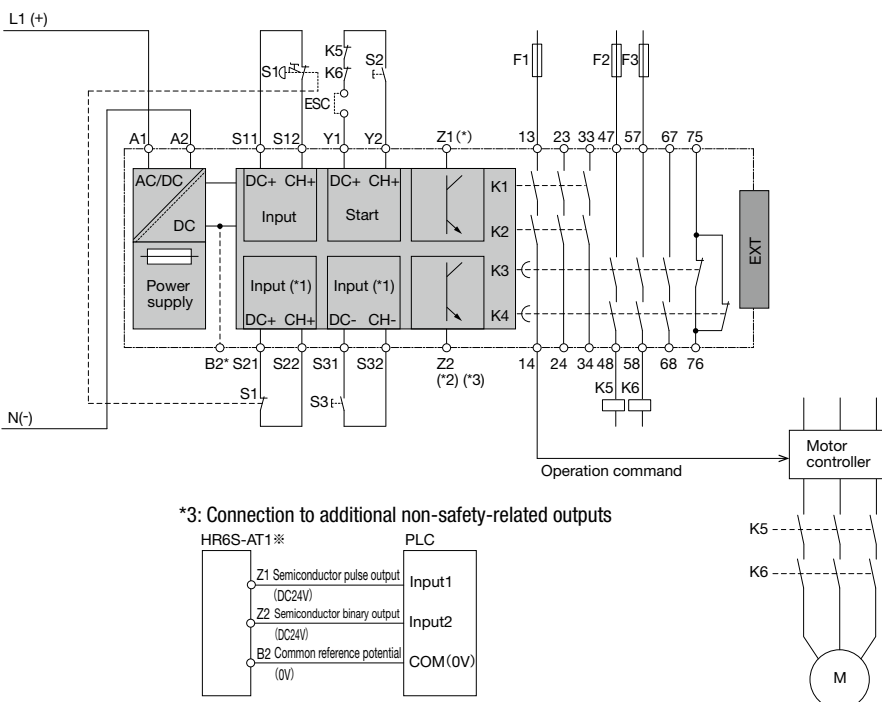
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Data Functional Safety

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 <sub>e</sub> , Category 4 Normally Closed: PL <sub>c</sub> , 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 <sub>d</sub> ) in 1/h (as per IEC 61508 and ISO 13849-1)	0.94 × 10 <sup>-9</sup> for Stop Category 0 0.95 × 10 <sup>-9</sup> for Stop Category 1	
Mean Time To Dangerous Failure (MTTF <sub>d</sub> ) in years (as per ISO 13849-1)	2,400 for Stop Category 0 2,300 for Stop Category 1	
Average Diagnostic Coverage (DC <sub>avg</sub> ) (as per ISO 13849-1)	≥99 %	
Maximum number of cycles over lifetime	DC-13	24V DC 1 A: 1200000 with Stop Category 0
		24V DC 1 A: 1200000 with Stop Category 1
		24V DC 3 A: 180000 with Stop Category 0
		24V DC 3 A: 275000 with Stop Category 1
	AC-1	250V AC 4 A: 180000 with Stop Category 0
		250 VAC 4 A: 90000 with Stop Category 1
	AC-15	250V AC 1 A: 70000 with Stop Category 0
		250V AC 1 A: 90000 with Stop Category 1
		250V AC 3 A: 39000 with Stop Category 0
		250V AC 3 A: 60000 with Stop Category 1

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

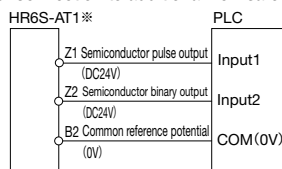
Wiring Example



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


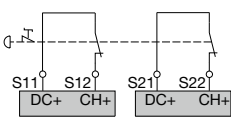


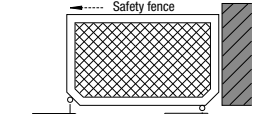
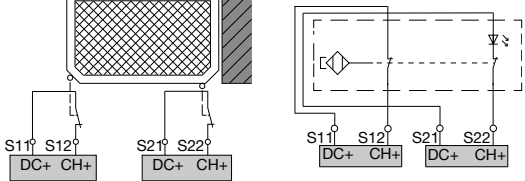



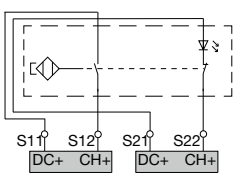

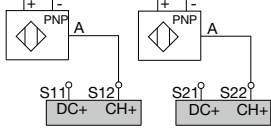
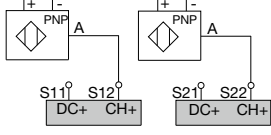
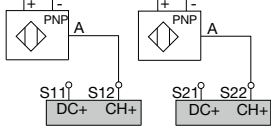

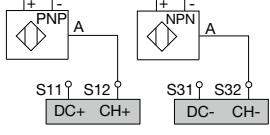

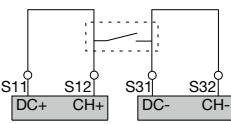


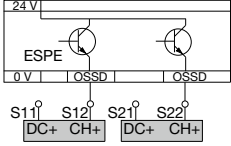
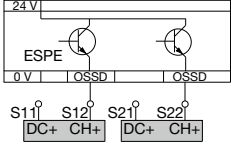
\*1: Inputs that are not used for safety device inputs can be used to cancel the delay function for safety-related outputs.  
\*2: Turns off while a safety-related output is on or when an error is detected.

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

\*2: Connection examples for coded magnetic switches such as HS7A (IDEC) are also included on the instruction sheet, but certifications are not available. Also, for 2NO, use dial 1 or 2.

Note: Status of contacts in the diagram: The status of the control switch is when it is not operated. The status of the door interlock is when the door is closed.