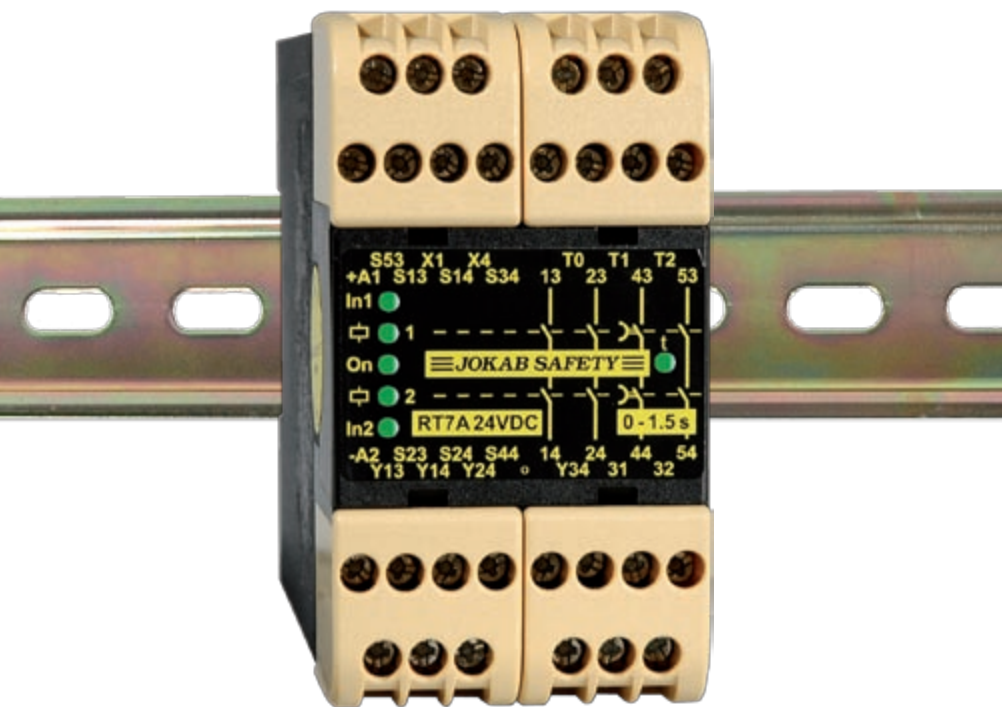


# Safety relay

# RT7



## Approvals:



## Safety relay for:

- Emergency stops
- Light curtains
- Three position devices
- Interlocked gates/hatches
- Magnetic switches
- Light beams
- Safety mats
- Contact strips
- Foot operated switches

## Features:

- 4 NO/1 NC relay outputs, 2 NO outputs can be delayed for soft stops
- Delay times RT7A 0; 0,5; 1,0; 1,5 s RT7B 0; 1,0; 2,0; 3,0 s
- Five input options
- Single or dual channel input
- Manual supervised or automatic reset
- Test input for supervision of external contactors
- Width 45 mm
- LED indication of supply, inputs, outputs, short-circuit and low voltage level
- Three voltage free transistor information outputs
- Supply 24 VDC, 24, 48, 115 or 230 VAC
- Quick release connector blocks

### Universal relay with delayed outputs

The RT7 is a universal relay that can be used to supervise both safety devices and the internal safety of your machinery. In addition, you can select the safety level that is required for each installation. All this is possible because the RT7 has the most versatile input options arrangement available on the market. The RT7 can therefore replace many other relays.

The RT7 has four (4 NO) dual safety outputs of which two may be delayed for up to three seconds in order to achieve a safe and 'soft' stop. A 'soft' stop allows machinery to brake and stop gently before power is removed. A 'soft' stop has many benefits: the machinery life will be prolonged, processed products will not be damaged, and restarts from the stopped position are made possible and easier.

Another option with the RT7 is manual or automatic resetting. A manual supervised reset is used for gates and other safety devices that can be bypassed, while an automatic reset is used for small safety hatches if deemed appropriate from a risk point of view.

In addition, the RT7 has information outputs that follow the inputs and outputs of the relay. These outputs indicate if for example a gate is opened or closed, if there is a delay or if the relay needs to be reset.

Choose the RT7 to simplify your safety circuits and reduce your costs.

## Inputs

The RT7 can be configured to operate in either of the following input options:

1. Single channel, 1 NO contact from +24 VDC, safety category 1, up to PL c
2. Dual channel, 2 NO contacts from +24 VDC, category 3, up to PL d
3. Dual channel, 1 NO, 1 NC contact from +24 VDC, category 4, up to PL e
4. Dual channel, 1 NO contact from 0V and 1 NO contact from +24 VDC, category 4, up to PL e
5. Safety mats/contact strips, 1 'contact' from 0V and 1 'contact' from +24 VDC, category 3, up to PL d

When the input/inputs are activated and the test/supervised reset is complete, relays 1,2,3 and 4 are activated. Relays 1 and 2 are immediately de-energized when the inputs are deactivated in accordance with the input option selected. Relays 3 and 4 are either de-energized immediately or after the selected time delay. All the relays (1,2,3 and 4) must be de-energized before the RT7 can be reset.

## Transistor output status information

The RT7 has three(3) voltage free transistor outputs that can be connected to a PLC, computer or other monitoring device. These outputs give the input and output status of the relay.

## Reset and testing

The RT7 has two reset options; manual and automatic.

The manual supervised reset is utilised when the RT7 is used to monitor safety devices that can be bypassed, i.e. to ensure that the outputs of the safety relay do not close just because the gate is closed.

The automatic reset should only be used if acceptable from a risk point of view. The RT7 can also test (supervise), if for example, contactors and valves etc are de-energized/de-activated before a restart is allowed.

## Indication of low voltage

The 'On' LED will flash if the relay voltage falls below an acceptable level. This indication will also be given if a monitored safety mat/contact strip is actuated. See connection option 5.

## Safety level

The RT7 has internal dual and supervised safety functions. Power failure, an internal faulty component or external interference will not present a risk to options with the highest safety level. A manual reset requires that the reset input is closed and opened before the safety relay outputs are activated. A short-circuit or a faulty reset button is consequently supervised.

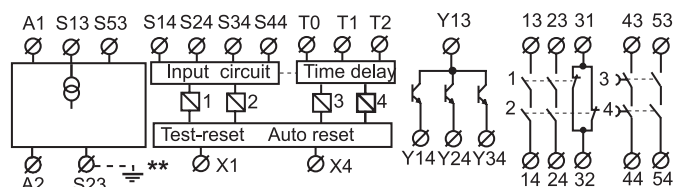
When the RT7 is configured for dual channel input, both the inputs are supervised for correct sequence operation before the unit can be reset. The input options 3 and 4 have the highest safety levels as all short-circuits and power failures are supervised. This in combination with internal current limitation makes the relay ideal for supervision of safety mats and contact strips.

## Regulations and standards

The RT7 is designed and approved in accordance with appropriate directives and standards. Se tekniska data.

## Connection examples

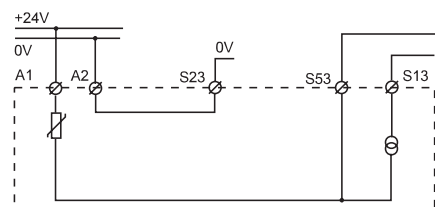
For examples of how our safety relays can solve various safety problems, see the section "Connection examples".



\*\*Only for AC supply

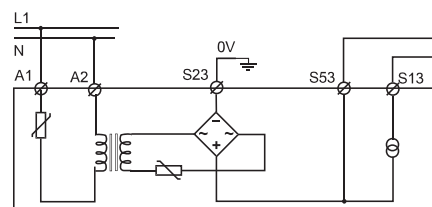
## Connection examples – RT7

### DC supply



The RT7 DC option should be supplied with +24 V on A1 and 0 V on A2.

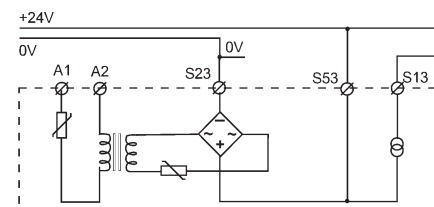
### AC supply



The RT7 AC option should be supplied with the appropriate supply voltage via connections A1 and A2.

The S23/⊥ must be connected to protective earth

### DC-supply of AC-units



Samtliga AC-moduler kan också matas med +24 VDC på S53 och 0V på S23.

### NOTE

With both DC and AC modules, if cable shielding is used this must be connected to an earth rail or an equivalent earth point.

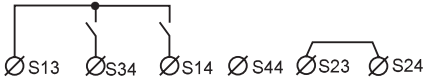
## Connection of safety devices - RT7 A/B

### 1. SINGLE CHANNEL, 1 NO from +24V



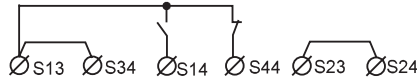
The input (contact to S14) must be closed before the outputs can be activated. When the input contact is opened the relay safety output contacts open.

### 2. DUAL CHANNEL, 2 NO from +24V



Both input contacts (S14 and S34) must be closed before the relay outputs can be activated. The safety relay contacts will open if one or both of the input contacts are opened. Both the input contacts must be opened before the relay can be reset. A short-circuit between the inputs S14 and S34 can only be supervised if the device connected to the inputs has short-circuit supervised outputs, e.g. JOKAB Focus light curtains.

### 3. DUAL CHANNEL, 1 NO, 1 NC from +24V



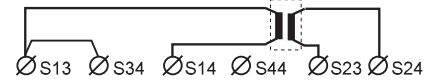
One input contact must be closed (S14) and one opened (S44) before the relay outputs can be activated. The safety relay contacts will open if one or both of the inputs change state or in the case of a short-circuit between S14 and S44. Both inputs must be returned to their initial positions before the relay outputs can be reactivated.

### 4. DUAL CHANNEL, 1 NO from +24V, 1 NO from 0V



Relay functions as option 2, but a short-circuit, in this case between inputs S14 and S24, is supervised (safety outputs are opened).

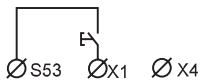
### 5. Safety mat/Contact strip



Both 'contact' inputs from an inactivated safety mat/contact strip, must be made in order to allow the RT7 relay outputs to be activated. When the safety mat/contact strip is activated or a short-circuit is detected across S14-S23, the relay will de-energize (safety outputs open) and the 'ON' LED will flash. As output S13 has an internal current limit of 70 mA, the RT7 will not be overloaded when the mat/contact strip is activated or a short circuit is detected.

## Reset connections - RT7 A/B

### Manual supervised reset



The manual supervised reset contact connected to input X1 must be closed and opened in order to activate the relay outputs.

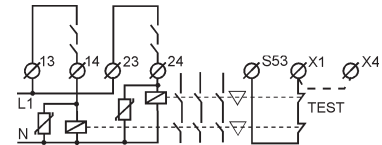
### Automatic reset



\*connected to S13 for safety mat/contact strip

Automatic reset is selected when S53, X1 and X4 are linked. The relay outputs are then activated at the same time as the inputs.

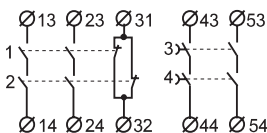
### Testing external contactor status



Contactors, relays and valves can be supervised by connecting 'test' contacts between S53 and X1. Both manual supervised and automatic reset can be used.

## Output connections - RT7 A/B

### Relay outputs



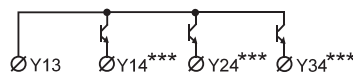
The RT7 has four (4 NO) safety outputs of which two can be delayed, and 1 NC information output.

In order to protect the RT7 output contacts it is recommended that loads (inductive) are suppressed by fitting correctly chosen VDR's, diodes etc. Diodes are the best arc suppressors, but will increase the switch off time of the load.

### \*\*\*NOTE

These outputs are only for information purposes and must not be connected to the safety circuits of the machinery.

### Transistor outputs



The RT7 has three(3) voltage free transistor information outputs.

The transistor outputs are supplied with voltage to Y13 either from S53 (+24V) or externally from 5 to 30 VDC. Y14, Y24 and Y34 follow the inputs and outputs as follows:

- Y14 becomes conductive when the relay input conditions are fulfilled.
- Y24 becomes conductive when both the output relays are activated.
- Y34 becomes conductive when both the delay output relays are activated.

### Time delay outputs

| RT7A | RT7B | T0 | T1 | T2 | RT7A | RT7B | T0 | T1 | T2 |
|------|------|----|----|----|------|------|----|----|----|
| 0.0s | 0.0s |    |    |    | 1.0s | 2.0s |    |    |    |
| 0.5s | 1.0s |    |    |    | 1.5s | 3.0s |    |    |    |

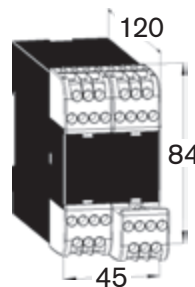
Time delays are selected by linking the appropriate T0, T1 and T2 connections.

When a stop signal is detected a program stop command is first given to the PLC/servo which brakes the dangerous machine operations in a 'soft' and controlled way.

The delayed relay safety outputs will then turn off the power to the motors, i.e. when the machinery has already stopped. It takes usually around 0.5 to 3 seconds for a dangerous action to be stopped softly.

| Technical data - RT7 A/B  |  |  |
|---|--|--|
| <b>Manufacturer</b>   | ABB AB/Jokab Safety, Sweden  |  |
| <b>Article number/Ordering data</b>   | RT7B 24DC 3 s 2TLJ010028R1000<br>115AC 3 s 2TLJ010028R1400<br>230AC 3 s 2TLJ010028R1500<br>RT7A 24DC 1,5 s 2TLJ010028R2000<br>115AC 1,5 s 2TLJ010028R2400<br>230AC 1,5 s 2TLJ010028R2500 |  |
| <b>Colour</b>   | Black and beige  |  |
| <b>Weight</b>   | 405 g (24 VDC)<br>550 g (24-230 VAC)   |  |
| <b>Supply</b><br>Voltage (A1-A2)  | 24 VDC +15/-20%,<br>24/48/115/230 VAC,<br>±15%, 50-60 Hz   |  |
| <b>Power consumption</b><br>DC supply, nominal voltage<br>AC supply, nominal voltage  | 4.6 W<br>8.8 VA  |  |
| <b>Connection S13</b><br>Short-circuit protected voltage output, 70 mA ±10% current limitation. Is used for the inputs S14, S34 and S44.  |  |  |
| <b>Connection S53</b><br>Short-circuit protected voltage output, internal automatic fuse, max 270 mA. Is used for the reset and autoreset inputs X1 and X4.   |  |  |
| <b>Connection S23</b><br>0V connection for input S24.   |  |  |
| <b>Safety inputs</b><br>S14 (+) input<br>S24 (0V) input<br>S34 (+) input<br>S44 (+) input   | 20 mA<br>20 mA<br>20 mA<br>25 mA   |  |
| <b>Reset input X1</b><br>Supply for reset input<br>Reset current<br><br>Minimum contact closure time for reset  | + 24VDC<br>600 mA current pulse at contact closure, then 30 mA.<br><br>100 ms  |  |
| <b>Maximum external connection cable resistance at nominal voltage for</b><br>S14, S24, S34<br>S44, X1  | 300 Ohm<br>150 Ohm   |  |
| <b>Response time</b><br>At Power on DC/AC<br>When activating (input-output)<br>When deactivating (input-output)<br>At Power Loss  | <90/<140 ms<br><20 ms<br><20 ms<br><80 ms  |  |
| <b>Delay time options</b><br>RT7A<br>RT7B   | 0; 0.5; 1.0; 1.5 secs<br>0; 1.0; 2.0; 3.0 secs   |  |
| <b>Relay outputs</b><br>NO direct (relays 1/2)<br>NO direct or delayed (relays 3/4)<br>NC (relays 1/2)<br>Maximum switching capacity<br>Relays 1/2 Resistive load AC<br>Inductive load AC<br>Resistive load DC<br>Inductive load DC<br>Relays 1/2 total | 2<br>2<br>1<br><br>6A/250 VAC/1500 VA<br>AC15 240VAC 2A<br>6A/24 VDC/150 W<br>DC13 24VDC 1A<br>Max 9A distributed on all contacts  |  |
| Relays 3/4 Resistive load AC<br>Inductive load AC<br>Resistive load DC<br>Inductive load DC   | 6A/230 VAC/1380 VA<br>AC15 230VAC 4A<br>6A/24VDC/144W<br>DC13 24VDC 2A   |  |

|  |  |
|--|--|
| Relays 3/4 total   | Max 6A distributed on all contacts   |
| Contact material   | AgSnO <sub>2</sub> + Au flash  |
| Fuses output 1/2 (external)<br>Fuses output 3/4 (external)   | 5A gL/gG<br>3A gL/gG   |
| Conditional short-circuit current (1 kA), each output  | 6A gG  |
| Mechanical life  | >10 <sup>7</sup> operations  |
| <b>Transistor outputs</b><br>External supply to Y13<br>Y14<br><br>Y24<br><br>Y34<br><br>Maximum load of Y14,Y24, Y34<br>Maximum voltage drop at maximum load | +5 to +30 VDC<br>Indicates that the input conditions are fulfilled<br>Indicates that the output relays 1/2 are activated<br>Indicates that the delay output relays 3/4 are activated<br>15 mA /output<br><br>2.4 V   |
| <b>LED indication</b><br>On ●<br><br>In1 ● In2 ●<br>☑ ● 1 ☑ ● 2<br><br>t ●   | Supply voltage OK, the LED is on. Flashing light in case of under-voltage or overload.<br>Indicates that the input conditions are fulfilled.<br>Indicates that the output relays 1/2 are activated.<br>Indicates that the delay output relays 3/4 are activated. |
| <b>Mounting</b><br>Rail  | 35 mm DIN rail   |
| <b>Connection blocks (detachable)</b><br>Maximum screw torque<br>Maximum connection area:<br>Solid conductors<br>Conductor with socket contact               | 1 Nm<br><br>1x4mm <sup>2</sup> /2x1,5mm <sup>2</sup> /12AWG<br>1x2,5mm <sup>2</sup> /2x1mm <sup>2</sup>  |
| <b>Protection class</b><br>Enclosure<br>Connection blocks  | IP 40 IEC 60529<br>IP 20 IEC 60529   |
| <b>Operating temperature range</b><br>24VDC<br><br>24-230VAC   | -10° C to + 55° C (with no icing or condensation)<br>-10° C to + 45° C (with no icing or condensation)   |
| <b>Operating humidity range</b>  | 35% to 85%   |
| <b>Impulse Withstand Voltage</b>   | 2.5kV  |
| <b>Pollution Degree</b>  | 2  |
| <b>Performance (max.)</b><br>The relays must be cycled at least once a year.   | Category 4/PL e<br>(EN ISO 13849-1:2008)<br>SIL 3 (EN 62061:2005)<br>PFH <sub>d</sub> 9.55E-09   |
| <b>Conformity</b>  | 2006/42/EC, 2006/95/EC,<br>2004/108/EC<br>EN 954-1:1996, EN 62061:2005<br>EN ISO 13849-1:2008  |



Connector blocks are detachable (without cables having to be disconnected)