

RT7 Safety Relay Universal Relay with Delayed 'Stop' 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.

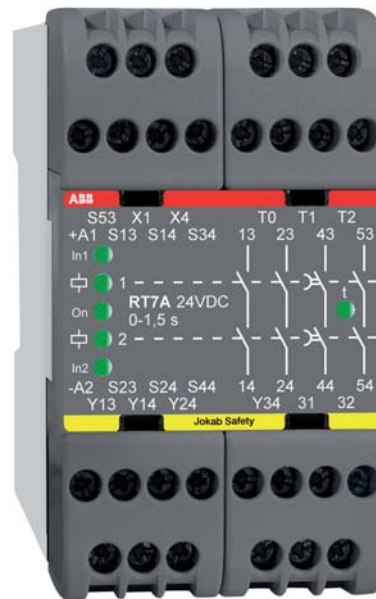
Another option with the RT7 is manual or automatic resetting. A manual supervised reset is used for gates and other safety devices that can be passed through, while an automatic reset is used for small safety hatches if deemed appropriate from a risk point of view.

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.

Connection Examples

For examples of how our safety relays can solve various safety problems, see "Connection Examples" beginning on page 5:44.



Applications

- Emergency Stops
- Light Curtains
- Three Position Devices
- Interlocked Gates/Hatches
- Magnetic Switches
- Light Beams
- Safety Mats
- Contact Strips
- Foot-Operated Switches

Features

- 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
- 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
- Three voltage free transistor information outputs
- 24 VDC
- 24, 48, 115 or 230 VAC
- Quick release connector blocks

Approvals



RT7 A/B Technical Information

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.
2. Dual channel, 2 NO contacts from +24 VDC, safety category 3.
3. Dual channel 1 NO, 1 NC contact from +24 VDC, safety category 4.
4. Dual channel, 1 NO contact from 0V and 1 NO contact from +24 VDC, safety category 4.
5. Safety mats/contact strips 1 'contact' from 0V and 1 'contact' from +24 VDC, safety category 1.

Note: Safety category only refers to the safety relay configuration, input devices, output devices and wiring must be considered for a safety category of the system.

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 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 used when the RT7 is monitoring safety devices that can be passed through, 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 deemed an acceptable risk.

In addition, 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 supply 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, 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.

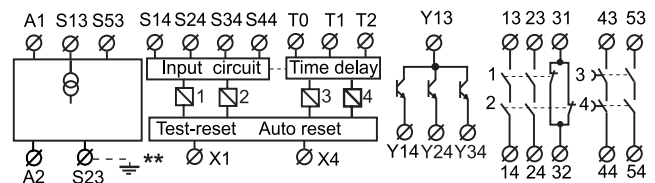
The input options 3 and 4 have the highest safety levels as all short-circuits and power failures are supervised. This in combination with double internal current limitation makes the relay ideal for supervision of safety mats and contact strips.

Regulations and Standards

The RT7 is designed and approved in accordance with appropriate directives and standards. Examples of such are: 98/37/EC, EN ISO 12100-1/-2, EN 60204-1 and EN 954-1/EN ISO 13849-1.

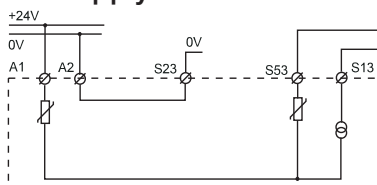
Connection Examples

For examples of how our safety relays can solve various safety problems, see "Connection Examples" beginning on page 5:44.



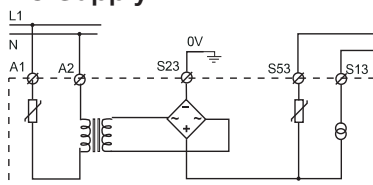
****Only for AC supply**

Connection of Supply DC Supply



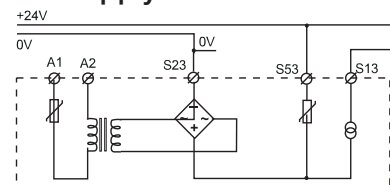
The RT7 DC option should be supplied with +24 V on A1 and 0 V on A2.

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



All AC-units can also be supplied by +24 VDC to S53 (0VDC to 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.

RT7 A/B Connection of Safety Devices

1. Single Channel, 1 NO from +24V



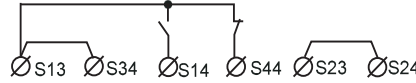
The input (contact to S14) must be closed before the outputs can be activated. When the input contact is opened the relay safety output contacts open.

2. Dual Channel, 2 NO from +24V



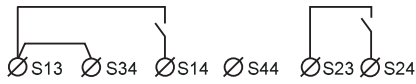
Both input contacts (S14 and S34) must be closed before the relay outputs can be activated. The safety relay contacts will open if one or both of the input contacts are opened. Both the input contacts must be opened and reclosed before the relay can be reset. A short-circuit between inputs S14 and S34 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



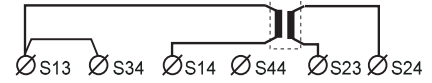
One input contact must be closed (S14) and one opened (S44) before the relay outputs can be activated. The safety relay contacts will open if one or both of the inputs change status or in case of a short-circuit between S14 and S44. Both inputs must return to their initial positions before the relay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

4. Dual Channel, 1 NO from +24V, 1 NO to 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 or Contact Strip

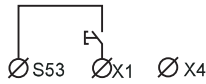


Both 'contact' inputs from an inactivated safety mat/contact strip must be made in order to allow the RT7 relay outputs to be activated. When the safety mat/contact strip is activated or a short-circuit is detected across S14-S23, the relay will de-energize (safety outputs open) and the 'ON' LED will flash. As output S13 has an internal current limit of 60 mA, the RT7 will not be overloaded when the mat/contact strip is activated or a short circuit is detected.

RT7 A/B Reset Connections

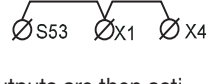
Manual Supervised Reset

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



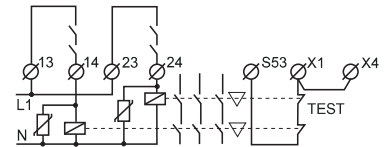
Automatic Reset

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



**connected to S13 for safety mat/contact strip*

Testing External Contactor Status



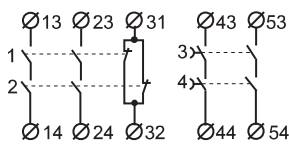
Contactors, relays and valves can be supervised by connecting 'test' contacts between S53 and X1. Both manual supervised and automatic reset can be used.

RT7 A/B Output Connections

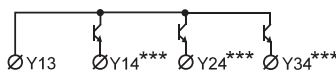
Relay Outputs

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 VDRs, diodes, etc. Diodes are the best arc suppressors, but will increase the switch off time of the load.



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 an external 5-30 VDC. Y14, Y24 and Y34 follow the relay 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.

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

Time Delay Outputs

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

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.

RT7 A/B Technical Data

Manufacturer	ABB AB/Jokab Safety, Sweden
Ordering information	See page 5:62
Color	Grey
Weight	405 g (24 VDC) 550 g (24-230 VAC)
Supply Voltage (A1-A2)	24 VDC +15/-20%, 24/48/115/230 VAC, ±15%, 50-60 Hz
Power consumption DC supply, nominal voltage AC supply, nominal voltage	4.6 W 8.8 VA
Connection S13 Short-circuit protected voltage output, 70 mA ±10% current limitation (Is used for the inputs S14, S34 and S44)	
Connection S53 Short-circuit protected voltage output, internal automatic fuse, max 270 mA (Is used for the reset and autoreset inputs X1 and X4)	
Connection S23 0V connection for input S24	
Safety inputs S14 (+) input S24 (0V) input S34 (+) input S44 (+) input	20 mA 20 mA 20 mA 25 mA
Reset input X1 Supply for reset input Reset current Minimum contact closure time for reset	+ 24VDC 600 mA current pulse at contact closure, then 30 mA 100 ms
Maximum external connection cable resistance at nominal voltage for S14, S24, S34 S44, X1	300 Ohm 150 Ohm
Response time At Power on DC/AC When activating (input-output) When deactivating (input-output) At Power Loss	<90/<140 ms <20 ms <20 ms <80 ms
Delay time options RT7A RT7B	0; 0.5; 1.0; 1.5 secs 0; 1.0; 2.0; 3.0 secs
Relay outputs NO direct (relays 1/2) NO direct or delayed (relays 3/4) NC (relays 1/2) Maximum switching capacity Relays 1/2 Resistive load AC Inductive load AC Resistive load DC Inductive load DC Relays 1/2 total	2 2 1 6A/250 VAC/1500 VA AC15 240VAC 2A 6A/24 VDC/150 W DC13 24VDC 1A Max 9A distributed on all contacts
Relays 3/4 Resistive load AC Inductive load AC Resistive load DC Inductive load DC Relays 3/4 total	6A/230 VAC/1380 VA AC15 230VAC 4A 6A/24VDC/144W DC13 24VDC 2A Max 6A distributed on all contacts
Contact material	AgSnO ₂ + Au flash
Fuses output 1/2 (external)	5A gL/gG
Fuses output 3/4 (external)	3A gL/gG

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

Note:
Connector
blocks are
detachable
without cables
having to be
disconnected.

