
ABB
X1 13 33
+A1 S14 23 43
1
E1T 0s 24VDC
2
-A2 S24 24 44
X2 14 34
ABB
S53 X1 X4
+A1 S13 S14 S34
In1
1
RT7A 230VAC
On 0-1,5 s
2
In2
-A2 S23 S24 S44
Y13 Y14 Y24
T0 T1 T2
13 23 43 53
14 24 44 54
Y34 31 32

Safety Relays

Why should you use safety relays?

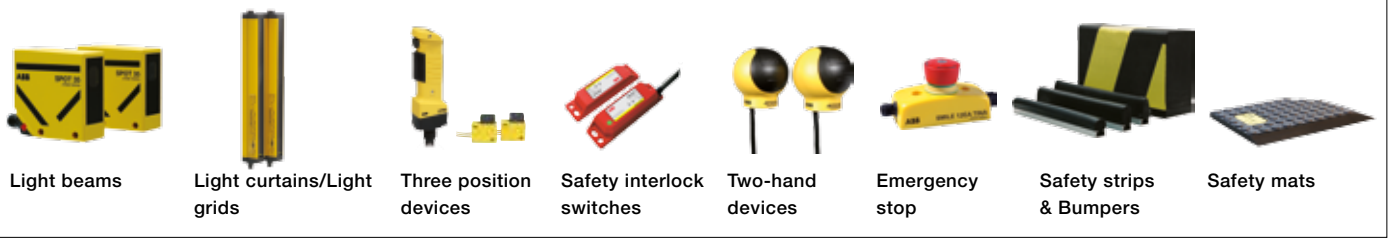
– to meet existing safety standards!

”A fault in the hardware or the software of the control system does not lead to hazardous situations”. This is the requirement in the EU´s Machinery Directive 2006/42/EC under the heading 1.2.1. Safety and reliability of control systems. The directive implies that no person should be put at risk if for example, a relay sticks or if a transistor or two electrical conductors short-circuit.

A safety relay will fulfill these requirements. A safety relay has, for example, inputs that are checked for short-circuits and dual redundant circuits that are checked at each operation. This can be compared to the dual brake circuits in a car. If one of the circuits is faulty the other will stop the car. In a safety relay there is an additional function which only allows a machine to start if both circuits are ok.

The standard for safety related parts of the control system describes various safety categories depending on the level of risk and application. One single universal relay with selectable safety categories solves this.

– to supervise safety devices!



Light beams | Light curtains/Light grids | Three position devices | Safety interlock switches | Two-hand devices | Emergency stop | Safety strips & Bumpers | Safety mats

– for safe stops and reliable restarts!

Dual stop signals when the gate is opened.
Entering or putting a hand or limb into a hazardous area must cause all machinery that can cause personal injury to stop safely. Many serious accidents occur when machinery is believed to have stopped but is in fact only pausing in its program sequence. The safety relay monitors the gate interlock switch and cables and gives dual stop signals.

Supervised reset when there can be a person within the risk area.
To make sure that nobody is within the restricted area when activating the reset button. A supervised reset button must be pressed and released before a reset can occur. Many serious accidents have been caused by an unintentional and unsupervised reset.

Timed reset when you cannot see the entire risk area.
Sometimes a double reset function is necessary to make sure that no one is left behind in the risk area. First, after ensuring no other person is inside the hazardous area, the pre-reset button must be activated, followed by the reset button outside the risk area within an acceptable time period e.g 10 seconds. A safety timer and a safety relay can provide this function.

Automatic reset for small hatches.
Where body entry is not possible through a hatch, the safety circuit can be automatically reset.

The safety relays are reset immediately when the hatch interlock switch contacts are closed.

The most flexible safety relays on the market!

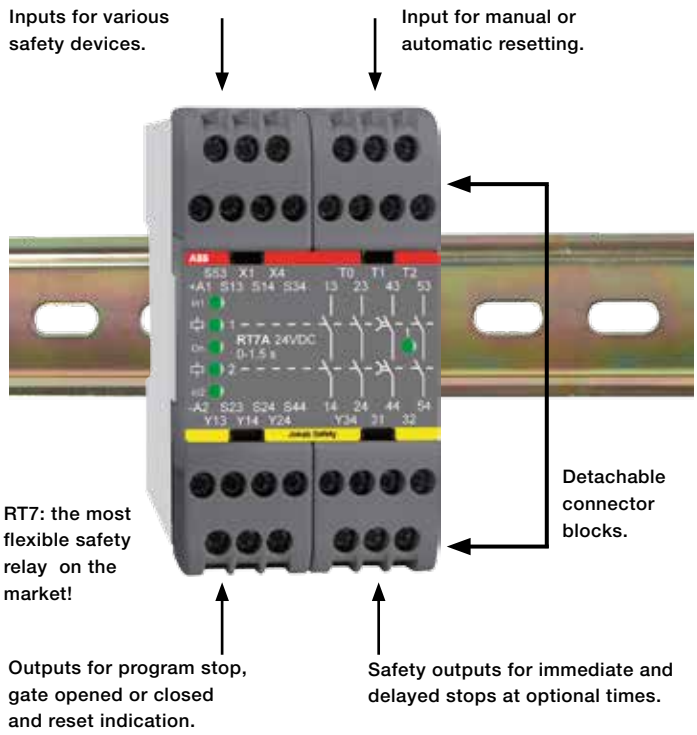
We have the most flexible safety relays on the market. Our first universal relay was developed in 1988. Nowadays, the flexibility is even greater and size has been reduced by 85 %.

A universal relay is a safety relay with various input options for various safety devices and risk levels.

Internally, the safety relay is of the highest safety level (PL e according to EN ISO 13849-1). A machine supplier can therefore, with one single safety relay, select the input configuration that best suits their customers' safety requirements. In addition, our safety relays have detachable connector blocks for ease of replacement and testing. As our universal relays incorporate all input options, they are compatible with all our previous safety relays as well as with other manufacturers' products.

Is a universal relay expensive? No, our latest patented construction is extremely simple and the number of major components is less compared to our previous universal relays. This means that the safety relays are even more reliable than before.

We also have a great deal of experience from safety solutions in our own system developments. It would be our pleasure to share these experiences with you! Please see the complete safety solutions in the section “Connection examples”. Please do not hesitate to contact us if you should require any other safety solutions.



Some of the advantages with ABB Jokab Safety’s safety relays

- Universal relays
- Excellent reliability
- Approved in Europe, USA, Canada
- Supervised reset
- Time reset
- Small and compact
- Detachable connector blocks
- Low power consumption
- Permits the use of long emergency stop cables
- EX compatibility
- Functions set by external hardwired links
- LED indication for inputs and outputs
- Powerful switching capacity

Summary Safety Relays

Which safety relay should you choose?

First of all, we would recommend the selection of one of our latest universal relays in the RT-series. These are both practical and cost effective.

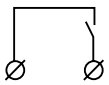
To facilitate the choice of safety relay or combinations of safety relays, please see:
- the table below dividing the safety relays into application fields
- the table on the opposite page showing possible input and output options
- the relevant data sheet giving comprehensive information about each specific safety relay
- the circuit diagram for various applications in the section “Connection examples”.

Note! All earlier types of relays that can now be replaced by those in this manual are still kept as stock items and can be supplied upon request.

Application fields

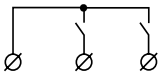
	Safety relays								Safety timers		Expansion relays			
	RT6	RT7	RT9	JSBRT11	JSBR4	JSBT4	JSBT5T, BT50T, BT51T	JSBT5, BT50, BT51	JSHT1A/B	JSHT2A/B/C	E1T	JSR1T	JSR2A	JSR3T
Interlocking switch/Gate/ Hatch	●	●	●	●	●	●	●	●						
Light curtains	●	●	●	●										
Light beams	●	●	●	●										
Safety mats	●	●	●		●	●								
Contact strips	●	●	●		●	●								
Two-hand control device					●									
Emergency stop	●	●	●	●	●	●	●	●						
Hold to run/enabling device	●	●	●	●	●	●				●				
Foot control device	●	●	●	●	●	●				●				
Area supervision	●	●	●	●	●	●								
Time resetting									●					
Time bypassing									●	●				
Inching										●				
Output expansion	●	●	●	●		●	●	●			●	●	●	
Delayed output		●					●				●	●		●

Input alternatives (see also technical data on the next page)



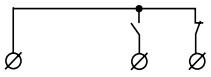
Single-channel, 1 NO from +24 V
Category 1, up to PL c

The input must be closed before the outputs can be activated. A stop signal is given when the input is opened.



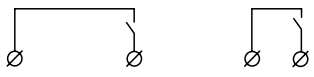
Two-channel, 2 NO from +24 V
Category 3, up to PL d

Both the inputs must be closed before the outputs can be activated. A stop signal is given if one or both of the inputs are opened. Both the inputs must be opened and reclosed before the outputs can be reactivated. A short-circuit between the inputs is not monitored by the safety relay. Category 4 can only be achieved if a safety device with short circuit monitored outputs is connected.



Two-channel, 1 NO & 1 NC from +24V Category 4, up to PL e

One input must be closed and one must be opened before the outputs can be activated. A stop signal is given if one or both of the inputs change position or if the inputs short-circuit. Both inputs must be put into their initial position before the outputs can be reactivated.



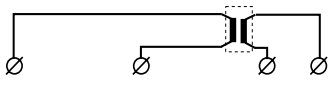
Two-channel, 1 NO from 0 V & Category 4, up to PL e

Both the inputs must be closed before the outputs can be activated. A stop signal is given if one or both of the inputs are opened. Both the inputs must be opened and reclosed before the outputs can be reactivated. A Stop signal is given if there is a short-circuit between the inputs.

Technical data

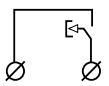
	Safety relays											Safety timers		Expansion relays			
	RT6	RT7	RT9	JSBRT11	JSBR4	JSBT4	JSBT5T	BT50T	BT51T	BT50	BT51	JSHT1A/B	JSHT2A/B/C	E1T	JSR1T	JSR2A	JSR3T
Safety category	1-4	1-4	1-4-	1-4	4	4	1-4°	1-4°	1-4°	1-4°	1-4°	1-4	1-4	1-4	1-4	1-4	1-4
Safety input																	
Single-channel, 1 NO from +24 V	●	●	●	●			●	●	●	●	●	●	●	●	●	●	●
Two-channel, 2 NO from +24 V	●	●	●	●													
Two-channel, 1 NO & 1 NC from +24 V	●	●	●	●													
Two-channel, 1 NO from 0 V & 1 NO from + 24 V	●	●	●	●	●	●						●	●	●	●	●	●
Contact strips/Safety mats	●	●	●		●	●											
Reset & test input																	
Monitored manual	●	●	●	●	●	●											
Automatic/Unmonitored manual	●	●	●	●		●	●	●	●	●	●						
Testing of contactors, relays, valves, etc.	●	●	●	●	●	●	●	●	●	●	●	●	●				
Output																	
NO	3	2	2	7	3	3				3	4			4*	4*	4	
NO delayable		2					3†	3	4					4*	4*		2¤
NO impulse outputs												2¤	2¤				
NC info	1	1		2	1	1				1					1*	1	
NC info delayable							1†	1							1*		
Info. output	2	3	1					1	1								
Switching capacity (resistive load)	4	3	2	9	4	4	4	4‡	4‡	4	4			4	5		
6A/250VAC/1500VA/150W												2¤	2¤				2¤
4A/250VAC/1000VA/100W		2‡															
6A/250VAC/1380VA/138W																5	
Width (mm) 10A/250VAC/1840VA/192W	45	45	22.5	100	45	45	22.5	22.5	22.5	22.5	22.5	45	45	22.5	45	45	22.5
Supply voltage																	
12VDC							●										
24VDC	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
24VAC	●						●									●	●
115VAC	●	●		●	●											●	
230VAC	●	●		●	●											●	

* Indicates the possibility of selecting delayed outputs ¤ Indicates one relay contact per output (other relays having two contacts per output)
‡ delay-able ° Category 4 depending on connection (When used as expansion relay with Pluto Safety PLC, then Category 4) † fixed 0.5 s delay



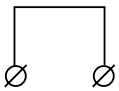
Contact strips/Safety mats
Category 3, up to PL d

For an unpressurised mat/strip, both the relay inputs must be closed for the outputs to be activated. In the case of an activated mat/strip and short-circuit input channels, the relay will be de-energized. Current limitation prevents the safety relay from being overloaded when the channels short-circuit.



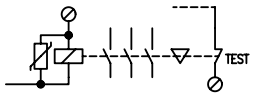
Monitored manual reset

A monitored reset means that the safety relay will not be reset if the reset button gets jammed when pressed in or if the input short-circuits. In order for the resetting to be complete, the input must be closed and opened before the outputs can close.



Automatic/unmonitored manual reset

Automatic reset means that the outputs are closed immediately when both the input conditions are satisfied and the test input is closed.



Testing of contactors, relays & valves

Can be carried out with both automatic and manual reset.

Safety relay
RT6

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:

- 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.
- 3 NO/1 NC relay outputs
- Two voltage free transistor information outputs
- Supply 24 VDC, 24, 115 or 230 VAC
- Quick release connector blocks

Would you like a single safety relay for all your safety applications?
Then choose the RT6 universal relay to supervise both your safety devices and the internal safety of your machinery. In addition you can select the safety level required for each installation. All this is possible because the RT6 has the most versatile input option arrangement available on the market. Many other relays can therefore be replaced by the RT6.

The relay also comes with other options such as manual or automatic reset. Manual supervised reset can be used for gates and other safety devices that can be by-passed. Automatic reset can be used for small hatches, if deemed acceptable from risk assessment.

The RT6 also has information outputs that follow the inputs and outputs of the relay. These outputs will for example indicate if a gate is open or closed and if the safety relay needs to be reset.

The RT6 is designed with a minimum amount of components thus keeping both production costs and component acquisitions to a minimum.

Choose the RT6 to simplify your safety circuits and reduce your costs.

RT6
Technical information

Inputs
The inputs from the safety devices must be connected according to one of the following options in order to fulfill the expected safety level and to avoid unsafe situations.

1. Single channel, 1NO contact from +24 VDC, category 1, up to PL c
2. Dual channel, 2NO contacts from +24 VDC, category 3, up to PL d
3. Dual channel 1NO, 1 NC contact from +24 VDC, category 4, up to PL e
4. Dual channel, 1NO contact from 0V and 1NO 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 and 2 are energized. Simultaneous activation is not required where there are dual channels. The two relays are de-energized when the input/inputs are de-activated in accordance with the input option chosen or in case of a power failure. Relays 1 and 2 must both be de-energized before the outputs can be activated again.

Transistor output status information
The RT6 has two 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 RT6 has two reset options; manual and automatic. The manual supervised reset is used when the RT6 is monitoring safety devices that can be bypassed, i.e. to ensure that the outputs of the safety relay do not close just because a gate is closed. The automatic reset should only be used if deemed an acceptable risk.

In addition, the RT6 can also test (supervise) whether, 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.

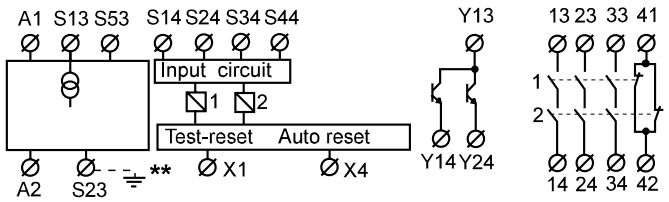
Safety level
The RT6 has internal dual and supervised safety functions. A short-circuit, internal faulty component or external interference will not present a risk to options with the highest safety level. A manual reset requires that the reset input is closed and opened before the safety relay outputs are activated. A short-circuit or a faulty reset button is consequently supervised.

When the RT6 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 RT6 is designed and approved in accordance with appropriate directives and standards. See technical data.

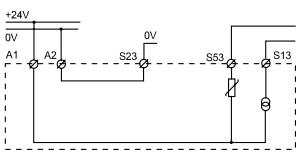
Connection examples
For examples of how our safety relays can solve various safety problems, see the section "Connection examples".



**Only for AC supply

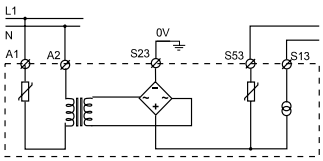
Connection of supply - RT6

DC supply



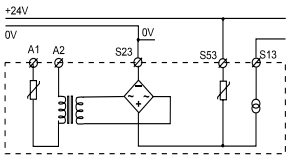
The RT6 DC option should be supplied with +24 V on A1 and 0 V on A2.

AC supply



The RT6 AC option should be supplied with the appropriate supply voltage via connections A1 and A2.
The S23/ ⏚ must be connected to protective earth.

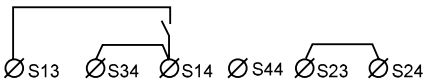
DC-supply of AC-units



All AC-units can also be supplied by +24 VDC to S53 (0VDC to S23).

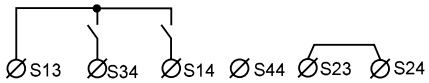
NOTE! With both DC and AC modules, if cable shielding is used this must be connected to an earth rail or an equivalent earth point.

Connection of safety devices - RT6



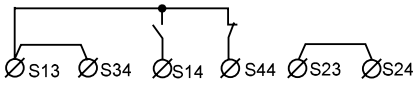
1. SINGLE CHANNEL, 1 NO from +24V

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.



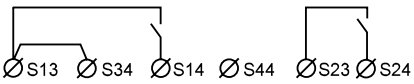
2. DUAL CHANNEL, 2 NO from +24V

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 JOKAB Focus light curtains.



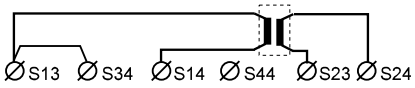
3. DUAL CHANNEL, 1 NO, 1 NC from +24V

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 case of a short-circuit between S14 and S44. Both inputs must return to their initial positions before the relay outputs can be reactivated. Both 'contact' inputs from a inactivated safety mat/contact strip must be made in order to allow the RT6 relay outputs to be activated. When the safety mat/contact strip is activa



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

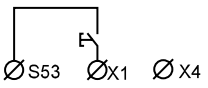
Relay functions as for option 2, but a short-circuit, in this case between inputs S14 and S24, is supervised (safety outputs are opened).



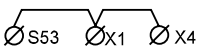
5. Safety mat/Contact strip

Both 'contact' inputs from a inactivated safety mat/contact strip must be made in order to allow the RT6 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 RT6 will not be overloaded when the mat/contact strip is activated or a short-circuit is detec

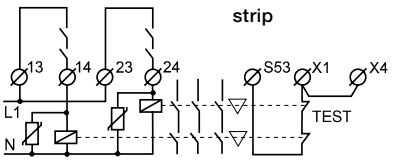
Manual supervised reset



Automatic reset



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



Testing external contactor status

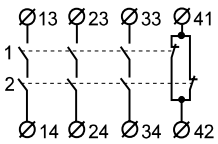
Reset connections - RT6

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

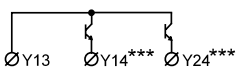
Automatic reset is selected when S53, X1 and X4 are linked. The relay outputs are then activated at the same time as the inputs.

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

Relay outputs



Transistor outputs



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

Output connections - RT6

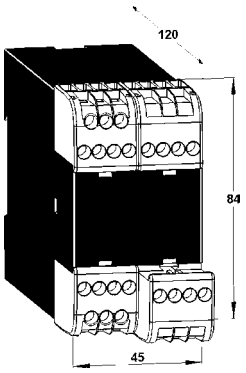
The RT6 has three (3 NO) safety outputs and 1 NC information output.
In order to protect the output contacts it is recommended that loads (inductive) are suppressed by fitting correctly chosen VDR's, diodes etc.
Diodes are the best arc suppressors, but will increase the switch off time of the load.
The RT6 has two(2) voltage free transistor outputs for information.
The transistor outputs are supplied with voltage to Y13, either from S53 (+24V) or an external 5-30 VDC supply. Y14 and Y24 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.

Technical data - RT6

Article number	
RT6 24 VDC	2TLA010026R0000
RT6 24 VAC	2TLA010026R0200
RT6 48 VAC	2TLJ010026R0300
RT6 115 VAC	2TLA010026R0400
RT6 230 VAC	2TLA010026R0500
Colour	Grey
Weight	335 g (24 VDC) 485 g (24-230 VAC)
Supply	
Voltage (A1-A2)	24 VDC +15/-20%, 24/115/230 VAC, +15/-10%, 50-60 Hz
Power consumption	
DC supply, nominal voltage	2.3 W
AC supply, nominal voltage	5.2 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 270 mA. Is used for the reset and autoreset inputs X1 and X4	
Connection S23 0V connection for input S24	
Safety inputs	
S14 (+) input	20 mA
S24 (0V) input	20 mA
S34 (+) input	20 mA
S44 (+) input	30 mA
Reset input X1	
Supply for reset input	+ 24 VDC
Reset current	300 mA current pulse at contact, then 30 mA
Minimum contact closure time for reset	100 ms
Maximum external connection cable resistance at nominal voltage for	
S14, S24, S34	300 Ohm
S44, X1	150 Ohm
Response time	
At Power on DC/AC	<90ms/<220ms
When activating (input-output)	<20 ms
When deactivating (input–output)	<20 ms
At Power Loss	<150 ms
Relay outputs	
NO	3
NC	1
Maximum switching capacity	
Resistive load AC	6A/250 VAC/1500 VA
Inductive load AC	AC15 240 VAC 2A
Resistive load DC	6A/24 VDC/150 W
Inductive load DC	DC13 24 VDC 1A
Maximum total switching capacity	
Resistive load	12A distributed on all contacts
Minimum load	10mA/10 V (if load on contact has not exceeded 100 mA)
Contact material	Ag+Au flash
Fuses Output (External)	5A gL/gG
Conditional short-circuit current (1 kA)	6A gG
Mechanical life	>10^7 operations

Transistor outputs	Short-circuit proof
External supply to Y13	+5 to +30 VDC
Y14	Indicates that the input conditions have been fulfilled
Y24	Indicates that the output relays are activated
Maximum load of Y14, Y24	15 mA /output
Maximum voltage drop at maximum load	2.4 V
LED indication	
On	Supply voltage OK, the LED is on. Flashing light in case of under-voltage or overload
In1 In2	Indicates that the input conditions are fulfilled.
1 2	Indicates that the output relays are activated.
Mounting	
Rail	35 mm DIN rail
Connection blocks (detachable)	
Maximum screw torque	1 Nm
Maximum connection area:	
Solid conductors	1x4 mm^2 / 2x1.5 mm^2 / 12AWG
Conductor with socket contact	1x2.5mm^2/2x1mm^2
Protection class	
Enclosure	IP40 IEC 60529
Connection blocks	IP20 IEC 60529
Operating temperature range	-10°C to + 55°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.	PL e/Cat. 4 (EN ISO 13849-1:2008) SIL 3 (EN 62061:2005)PFH_D 1.35 E-08
Conformity	2006/42/EC, 2006/95/EC, 2004/108/EC, EN 62061:2005, EN ISO 13849-1:2008



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

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, 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.

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, 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.

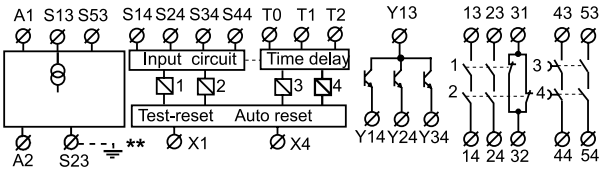
Indication of low voltage
The 'On' LED will flash if the relay voltage falls below an acceptable level. This indication will also be given if a monitored safety mat contact strip is actuated. See connection option 5.

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.

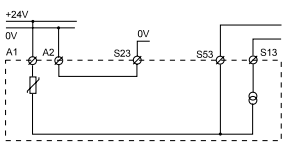
Connection examples
For examples of how our safety relays can solve various safety problems, see the section "Connection examples".



**Only for AC supply

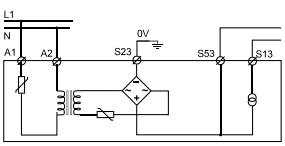
Connection examples – RT7

DC supply



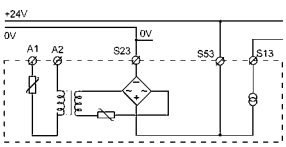
The RT7 DC option should be supplied with +24 V on A1 and 0 V on A2.

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

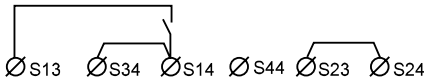


All AC-units can also supplied by +24 VDC to S53 (0 VDC to S23).

Connection of safety devices - RT7 A/B

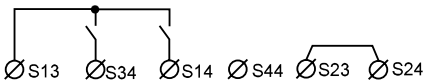
1. SINGLE CHANNEL, 1 NO from +24V

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.



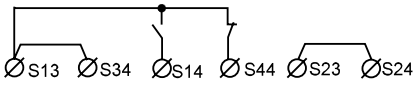
2. DUAL CHANNEL, 2 NO from +24V

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. ABB Jokab Safety´s Focus light curtains.



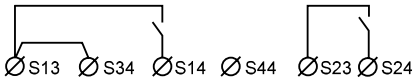
3. DUAL CHANNEL, 1 NO, 1 NC from +24V

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.



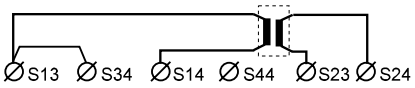
4. DUAL CHANNEL, 1 NO from +24V, 1 NO from 0V

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



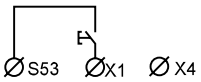
5. Safety mat/Contact strip

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.

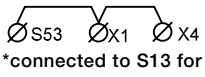


Reset connections - RT7 A/B

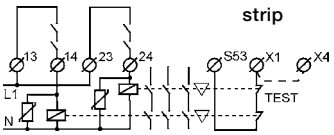
Manual supervised reset



Automatic reset



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



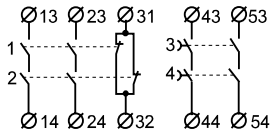
Testing external contactor status

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

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

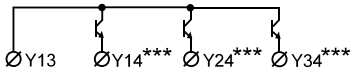
Contactors, relays and valves can be supervised by connecting ‘test’ contacts between S53 and X1. Both manual supervised and automatic reset can be used.

Output connections - RT7 A/B



Relay outputs

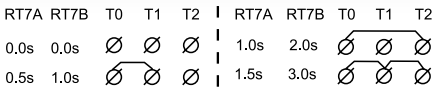
The RT7 has four (4 NO) safety outputs of which two can be delayed, and 1 NC information output.
In order to protect the RT7 output contacts it is recommended that loads (inductive) are suppressed by fitting correctly chosen VDR’s, diodes etc. Diodes are the best arc suppressors, but will increase the switch off time of the load.



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

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

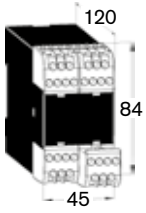
When a stop signal is detected a program stop command is first given to the PLC/servo which brakes the dangerous machine operations in a ‘soft’ and controlled way.

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

Article number		
RT7B	24 VDC 3 s	2TLA010028R1000
	24 VAC 3 s	2TLA010028R1200
	115 VAC 3 s	2TLA010028R1400
	230 VAC 3 s	2TLA010028R1500
RT7A	24 VDC 1.5 s	2TLA010028R2000
	24 VAC 1.5 s	2TLA010028R2200
	115 VAC 1.5 s	2TLA010028R2400
	230 VAC 1.5 s	2TLA010028R2500
Colour		Black and beige
Weight		405 g (24 VDC)
		550 g (24-230 VAC)
Supply		
Voltage (A1-A2)		24 VDC +15/-20%,
		115/230 VAC,
		±15%, 50-60 Hz
Power consumption		
DC supply, nominal voltage		4.6 W
AC supply, nominal voltage		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		20 mA
S24 (0V) input		20 mA
S34 (+) input		20 mA
S44 (+) input		25 mA
Reset input X1		
Supply for reset input		+ 24VDC
Reset current		600 mA current pulse at contact closure, then 30 mA.
Minimum contact closure time for reset		100 ms
Maximum external connection cable resistance at nominal voltage for		
S14, S24, S34		300 Ohm
S44, X1		150 Ohm
Response time		
At Power on DC/AC		<90/<140 ms
When activating (input-output)		<20 ms
When deactivating (input–output)		<20 ms
At Power Loss		<80 ms
Delay time options		
RT7A		0; 0.5; 1.0; 1.5 secs
RT7B		0; 1.0; 2.0; 3.0 secs
Relay outputs		
NO direct (relays 1/2)		2
NO direct or delayed (relays 3/4)		2
NC (relays 1/2)		1
Maximum switching capacity		
Relays 1/2	Resistive load AC	6A/250 VAC/1500 VA
	Inductive load AC	AC15 240 VAC 2A
	Resistive load DC	6A/24 VDC/150 W
	Inductive load DC	DC13 24 VDC 1A
Relays 1/2 total		Max 9A distributed on all contacts
Relays 3/4	Resistive load AC	6A/230 VAC/1380 VA
	Inductive load AC	AC15 230 VAC 4A
	Resistive load DC	6A/24 VDC/144W
	Inductive load DC	DC13 24 VDC 2A
Relays 3/4 total		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	+5 to +30 VDC
Y14	Indicates that the input conditions are fulfilled
Y24	Indicates that the output relays 1/2 are activated
Y34	Indicates that the delay output relays 3/4 are activated
Maximum load of Y14,Y24, Y34	15 mA /output
Maximum voltage drop at maximum load	2.4 V
LED indication	
On	Supply voltage OK, the LED is on. Flashing light in case of under-voltage or overload.
In1 In2	Indicates that the input conditions are fulfilled.
1 2	Indicates that the output relays 1/2 are activated.
t	Indicates that the delay output relays 3/4 are activated.
Mounting	
Rail	35 mm DIN rail
Connection blocks (detachable)	
Maximum screw torque	1 Nm
Maximum connection area:	
Solid conductors	1x4 mm^2 / 2x1,5 mm^2/12AWG
Conductor with socket contact	1x2.5 mm^2/ 2x1 mm^2
Protection class	
Enclosure	IP40 IEC 60529
Connection blocks	IP20 IEC 60529
Operating temperature range	
24 VDC	-10° C to + 55° C (with no icing or condensation)
24-230 VAC	-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.)	PL e/Cat. 4 (EN ISO 13849-1:2008) SIL 3 (EN 62061:2005) PFH_D 1.86 E-08
The relays must be cycled at least once a year.	
Conformity	2006/42/EC, 2006/95/EC, 2004/108/EC EN 62061:2005 EN ISO 13849-1:2008



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

Safety relay
RT9

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:

- Five input options
- Single or dual channel input
- Manual supervised or automatic reset
- Test input for supervision of external contactors
- Width 22.5 mm
- LED indication of supply, inputs and outputs, short-circuit and low voltage level
- 2 NO relay outputs
- One changeover relay with a double information output Supply 24 VDC
- Quick release connector blocks

Would you like a small safety relay for all your safety applications?
Then choose the compact RT9 universal relay to supervise both your 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 due to the RT9 offering the most versatile input option arrangement available on the market. The RT9 can therefore replace many other relays.

Other RT9 options include selection of either manual supervised or automatic resetting. The manual supervised reset can be used for gates and other safety devices that can be bypassed. Automatic reset can be used for small safety hatches, if deemed acceptable from risk assessment.

In addition, the RT9 has a double information output that will indicate e.g if a gate is open or if the relay needs resetting.

The RT9 uses the latest component technology and modern assembly techniques to ensure a highly cost effective solution.

Choose the RT9 to simplify your safety circuits and reduce your costs.

RT9
Technical information

Inputs
The RT9 can be configured to operate in either of the following input options:

1. Single channel, 1 NO contact from +24 VDC, 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 mat/contact strips, 1 'contact' from 0V and 1 'contact' +24 VDC, category 3, up to PL d

When the input/inputs are activated and the test/supervised reset is complete, relays 1 and 2 are energised. These are de-energised when the input/inputs are de-activated in accordance with the input option chosen or in case of a power failure.

Relays 1 and 2 must both be de-energized before the RT9 can be reset.

Relay output status information
The RT9 has a changeover contact relay output that can be connected to a PLC, control lamp, computer or similar. The output gives information about the status of the relay.

Reset and testing
The RT9 has two reset options; manual and automatic. The manual supervised reset can be used when the RT9 is monitoring safety devices that can be bypassed, i.e. to ensure that the outputs of the safety relay do not close just because a gate is closed. The automatic reset option should only be used if appropriate from a risk point of view.

Due to special internal circuits the RT9 can be automatically reset regardless of the operational voltage rise time, this being an important factor when large loads are started up on the same power supplies at the same time.

In addition, the RT9 can also test (supervise), if for example, contactors and valves etc are de-energised/de-activated before a restart is made.

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. Please see Connection option 5.

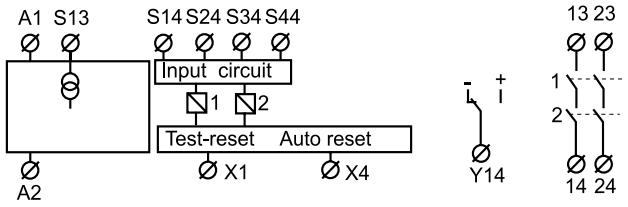
Safety level
The RT9 has internal dual and supervised safety functions. Power failure, an internal faulty component or external interference will not present a risk to options with the highest safety level. A manual reset requires that the reset input is closed and opened before the safety relay outputs are activated. A short-circuit or a faulty reset button is consequently supervised.

When the RT9 is configured for dual channel input, both the inputs are supervised for correct 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 an internal current limitation makes the relay ideal for supervision of safety mats and contact strips.

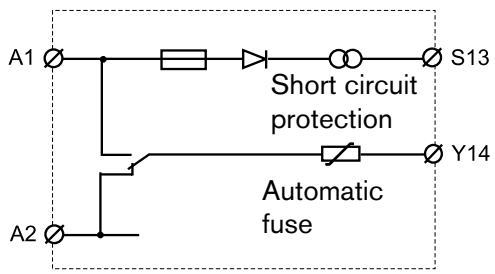
Regulations and standards
The RT9 is designed and approved in accordance with appropriate directives and standards. See technical data.

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



Connection of supply - RT9

DC supply



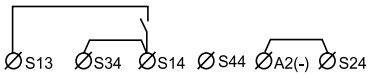
The RT9 should be supplied with +24 V on A1 and 0 V on A2.

NOTE! If cable shielding is used this must be connected to an earth rail or an equivalent earth point.

Connection of safety devices - RT9

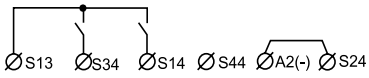
1. SINGLE CHANNEL, 1 NO from +24V

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.

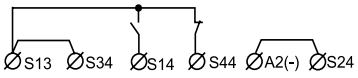


A short-circuit between inputs S14 and S34 can only be supervised if the device connected to the inputs has short-circuit supervised outputs, e.g. ABB Jokab Safety´s Focus light curtains

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

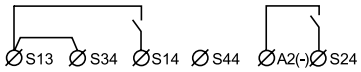
One input contact must be closed (S14) and one opened (S44) before the relay outputs can be activated.

The safety relay contacts will open if one or both of the inputs change state or in case of a short-circuit between S14 and S44. Both inputs must be returned to their initial status before the relay outputs can be reactivated.



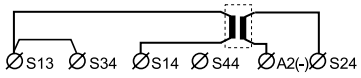
4. DUAL CHANNEL, 1 NO from +24V, 1 NO from 0V

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

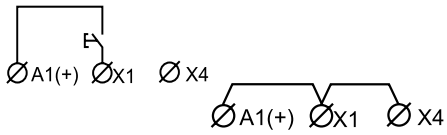


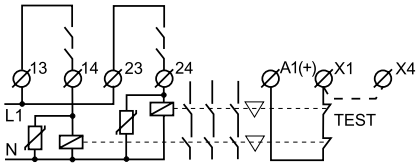
5. Safety mat/Contact strip

Both ‘contact’ inputs from a inactivated safety mat/contact strip must be made in order to allow the RT9 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 contacts open) and the ‘ON’ LED will flash. As output S13 has an internal current limit of 70 mA, the RT9 will not be overloaded when the mat/contact strip is activated or a short-circuit is detected.



Reset connections - RT9





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

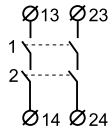
Automatic reset is selected when A1(+), X1 and X4 are linked. The relay outputs are then activated at the same time as the inputs.

Testing external contactor status

Contactors, relays and valves can be supervised by connecting ‘test’ contacts between A1(+) and X1. Both manual supervised and automatic reset can be used.

Output connections - RT9

Relay outputs



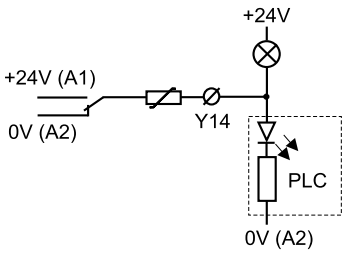
The RT9 has two (2 NO) safety outputs.

In order to protect the 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.

Information outputs

The RT9 has a single changeover contact information relay output.The relay output Y14 is connected internally to 0V and 24V in the following way:

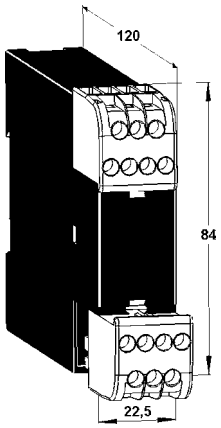
- Y14 is internally closed to 0V when the RT9 is not reset.
- Y14 is internally closed to +24V when the relay is reset.



Technical data – RT9

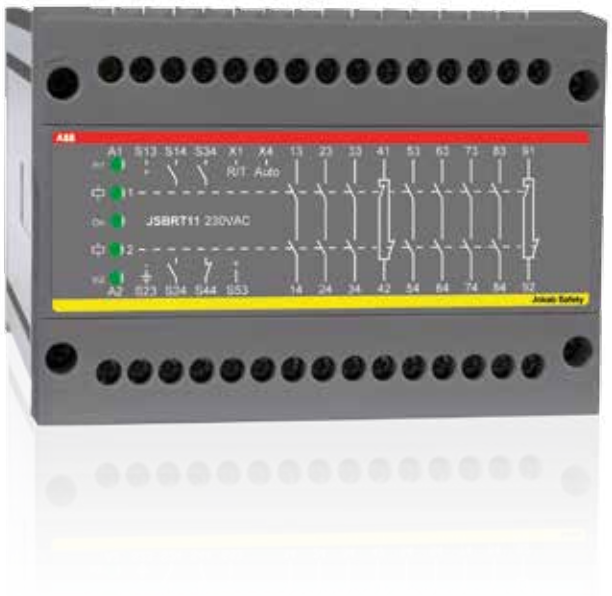
Article number RT9 24 VDC	2TLA010029R0000
Colour	Grey
Weight	210 g
Supply Voltage (A1-A2)	24 VDC ±20%
Power consumption Nominal voltage	2 W
Connection S13	Short-circuit protected voltage output 70 mA ± 10% current limitation. Is used for the inputs S14, S34 and S44.
Input currents (at nominal supply voltage) S14 (+) input S24 (0V) input S34 (+) input S44 (+) input	 30 mA 20 mA 20 mA 25 mA
Reset input X1 Supply for reset input Reset current Minimum contact closure time for reset Minimum contact closure time (at low limit voltage -20%)	 + 24 VDC 300 mA current pulse at contact closure, then 30 mA 80 ms 100 ms
Maximum external connection cable resistance at a nominal voltage for S14, S24, S34 S44, X1	 300 Ohm 150 Ohm
Response time At Power on When activating (input-output) When deactivating (input–output) At Power Loss	 <100 ms <20 ms <20 ms <80 ms
Relay outputs NO Maximum switching capacity Resistive load AC Inductive load AC Resistive load DC Inductive load DC Max. total switching capacity: Minimum load	 2 6A/250 VAC/1500 VA AC15 240 VAC 2A 6A/24 VDC/150 W DC13 24 VDC 1A 8A distributed on all contacts 10 mA/10V (if load on contact has not exceeded 100 mA)
Contact material	Ag+Au flash
Fuses output (External)	5A gL/gG
Conditional short-circuit current (1 kA)	6A gG
Mechanical life	10^7 operations
Relay information output Y14 (Changeover contacts) -(0V) +(24V) Maximum load of Y14 Short-circuit protection for information output	 Indicates that RT9 is not reset. Indicates that RT9 is reset. 250 mA Internal automatic fuse

LED indication On In1 In2 1 2	 Supply voltage OK, the LED is on. Flashing light in case of under-voltage, overload or current limiting Indicates that the input conditions are fulfilled. Indicates that the output relays have been activated.
Mounting Rail	 35 mm DIN rail
Connection blocks (detachable) Maximum screw torque Maximum connection area: Solid conductors Conductor with socket contact	 1 Nm 1x4 mm^2 / 2x1.5 mm^2 / 12AWG 1x2.5 mm^2 / 2x1 mm^2
Protection class Enclosure Connection blocks	 IP40 IEC 60529 IP20 IEC 60529
Operating temperature range	-10°C to + 55°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.	PL e/Cat. 4 (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 62061:2005 EN ISO 13849-1:2008



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

Safety relay
JSBRT11



Approvals:

Safety relay for:

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

Features:

- Selectable inputs and safety category
- Manual supervised or automatic reset
- Width 100 mm
- LED indication for supply, inputs and outputs
- 7 NO + 2 NC relay outputs
- Supply 24 VDC 15 or 230 VAC
- Quick release connector blocks

A flexible safety relay with many outputs

The JSBRT11 has been designed to provide the safety system circuit designer with the ability to select from both a range of input connection configurations and either automatic or supervised reset.

The unit can be hardwire configured to operate in either of the following input configurations:

- Mode 1: Single Channel (1 NO contact from +24 VDC), category 1 PL c
- Mode 2: Dual Channel (2 NO contacts from +24 VDC), category 3 PL d
- Mode 3: Dual Channel (1 NO, 1NC contacts from +24 VDC), category 4 PL e.
- Mode 4: Dual Channel (1 NO contact from 0 V and 1 NO contact from + 24 VDC), safety category 4.

In addition the unit can also be used to test that contactors and valves have fallen/returned to their 'reset' state before a new 'start' signal is given.

Safety level

The JSBRT11 has dual and monitored internal safety functions. Power failure, internal component failures or external interference (with the exception of short circuiting of input contact when used in a single channel input mode) do not result in a dangerous function.

When wired for supervised reset, should a short circuit appear across the reset input the relay will not automatically reset when the input/inputs are made. Only when the super-vised reset input is made and broken will the relay reset.

The JSBRT11 provides detection of contact failure in the inputs when wired in dual channel mode. Both inputs have to be opened and closed in order to enable the reactivation of the relay. The highest safety level of the JSBRT11 is in configuration mode 3 and 4 because all short circuits are supervised i.e. a short circuit between the inputs leads to a safe state as the outputs drop out.

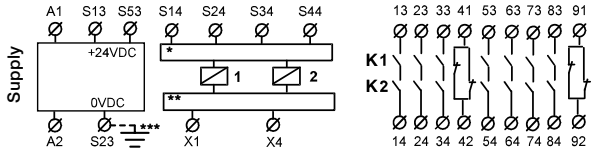
Regulations and standards

The JSBRT11 is designed and approved in accordance with appropriate directives and standards. See technical data.

Connection examples

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

Technical description – JSBRT11



***Supervision circuit** ****Test and Automatic reset circuit**
***** Only for AC-supply**

The supply voltage is connected across A1 and A2. The input connection configuration and type of reset required is set by connecting the unit as shown in the diagrams below

When the input/inputs and the test/supervised reset are made K1 and K2 energise. K1 and K2 will de-energize if the power is disconnected or a stop signal is given in accordance to the configuration mode wired. Both K1 and K2 have to be de-activated before the outputs of the JSBRT11 can be closed again.

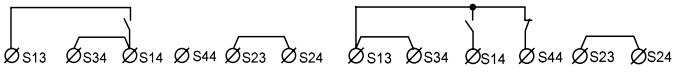
– **Configuration mode 1.**
When the single input opens both K1 and K2 relays are deactivated.
– **Configuration mode 2.**
Both inputs have to be closed in order to enable the unit to be activated. A stop signal is given if both or one input is opened. Both inputs have to be opened and reclosed in order to enable the reactivation of the unit. If the possibility of short circuits between the inputs cannot be excluded, configuration mode 3 or 4 should be used in order to reach the highest safety level.
– **Configuration mode 3.**
One input has to be closed and the other input has to be opened in order to enable the unit to be activated. A stop signal is given if both or one input change state. Both inputs have to change state in order to give a dual stop function and to allow a new start after stop.
– **Configuration mode 4.**
Operation as mode 2 but short circuits between the inputs leads to a safe state i.e. the relays inside the JSBRT11 will drop out.
– **Supervised reset connection.**
The input to X1 (see diagram below) has to be closed and opened in order to activate the unit, after input/inputs are made according to the configuration mode selected. This mode is selected when X1 - X4 is open-circuit.
– **Automatic reset connection.**
The input has to be closed in order to activate the unit after input/inputs are made according to the configuration mode selected. This mode is selected when a connection between X1 and X4 is made.
– **Test.**
Test contacts of contactors can be connected between S53 and X1 for supervision.

Technical data – JSBRT11

Article number JSBRT11 24 VDC JSBRT11 115 VAC JSBRT11 230 VAC	 2TLA010025R0000 2TLA010025R0400 2TLA010025R0500
Colour	Grey
Power supply A1 - A2	24 VDC ± 15% 115, 230 VAC ± 15%, 50-60 Hz
Power consumption	3.2 W/7.9 VA
Relay Outputs	7 NO and 2 NC
Max. switching capacity Resistive load AC Inductive load AC Resistive load DC Inductive load DC	 6A/250 VAC/1500 VA AC15 240 VAC 2A 6A/24 VDC/150 W DC13 24 VDC 1A
Max. total switching capacity	21A distributed on all contacts
Min. load	10mA/10 V (if load on contact has not exceeded 100 mA)
Contact material	$AgSnO_2$+ Au flash
Fuses Output (External)	6A gL/gG
Conditional short-circuit current (1 kA)	6A gG
Max. Input wire res. at nom. voltage	200 Ohm (S14,S24,S34,X1,X4); 100 Ohm (S44)
Response time at deactivation (input-output)	<20 ms
Response time at activation (input-output)	<30 ms
Terminals (max. screw torque 1 Nm) Single strand: Conductor with socket contact:	 1x4 mm^2 / 2x1.5 mm^2 1x2.5 mm^2 / 2x1 mm^2
Mounting	35 mm DIN-rail
Protection class enclosure terminals	 IP40 IEC 60259 IP20 IEC 60259
Impulse withstand voltage	2.5kV
Pollution degree	2
Operating temperature range	-10°C to +55°C (with no icing or condensation)
Operating humidity range	35% to 85%
Function indication	Electrical Supply, Input 1 and 2, Output relays 1 and 2
Weight	610 g (24 VDC) 790 g (24-230 VAC)
Performance (max.) Functional test: The relays must be cycled at least once a year.	PL e/Cat. 4 (EN ISO 13849-1:2008) SIL 3 (EN 62061:2005) PFH_D 1.69E-08
Conformity	2006/42/EC, 2006/95/EC, 2004/108/EC, EN 62061:2005 EN ISO 13849-1:2008

Electrical connection – JSBRT11

SINGLE CHANNEL *, 1 NO from +24V **DUAL CHANNEL*, 1 NO, 1 NC from +24V**



Safety relay
JSBR4

Approvals:

Safety relay for:

- Two-hand devices of type IIIc
- Emergency stop
- Three position devices
- Interlocked Gates/Hatches
- Contact strips
- Safety mats
- Foot operated switches

Features:

- Two channel with concurrency requirement of 0.5 s
- Supervised reset
- Test input
- Width 45 mm
- LED indication for supply, inputs and outputs
- 3 NO/1NC relay outputs
- Supply 24 VDC, 24, 115 or 230 VAC
- Quick release connector blocks

A universal relay for two-hand and many other safety devices

The JSBR4 has two inputs, which both have to be closed to keep the safety output contacts closed. A short-circuit across the inputs will cause the output contacts to open. The inputs can however be subjected to a continuous short-circuit without damaging the safety relay.

In order to make the safety outputs close the reset input must be closed and opened. In this way an unintentional reset is prevented in the case of a short-circuit in the reset button cable or if the button gets jammed in the actuated position. The reset input can also be used for test/supervision to ensure that contactors or valves have returned to their initial off/stop position before a new start can be allowed by the safety relay.

When the JSBR4 is used as a two-hand device relay, both buttons have to be pressed within 0.5 seconds of each other in order to close the outputs.

When the JSBR4 is used for Safety Mats and Safety Strips the ”stop” condition is given following detection of a short-circuit between input channels A and B. The safety mat, safety strip or the relay will not be damaged by a continuous short-circuit. This also gives the advantage that if there is a failure between the inputs in the installation, the safety relay will not be damaged.

Safety level

The JSBR4 has a twin supervised safety function. Component failure, short-circuit or external disturbance (e.g. loss of power supply) will not prevent the safe function of the relay. This is valid both for the inputs A and B as well as for the reset input. The JSBR4 operates at the highest safety level for safety relays (PL e according to EN ISO 13849-1).

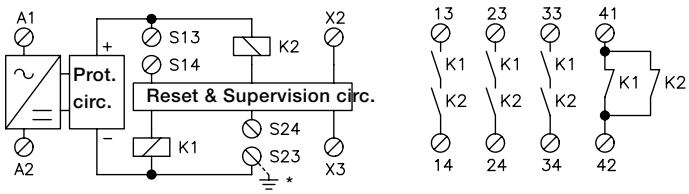
Regulations and standards

The JSBR4 is designed and approved in accordance with appropriate directives and standards. See technical data.The JSBR4 complies with the highest safety level for the connection of a two-hand device of type IIIc in accordance with EN 574.

Connection examples

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

Technical description – JSBR4



* Only for AC-supply

The electrical supply is connected across A1 and A2. After Voltage reduction and Rectification (AC-versions) or reverse polarity protection (DC-version) there is an overload protection-circuit.

When the inputs S13-S14 and S23-S24 have closed and the reset is made, the relays K1 and K2 are activated. A dual stop signal is given when K1 and K2 drop, due to short circuiting between the inputs, opening of the inputs or power failure. If one input is opened the other input must also be opened for K1 and K2 to be activated again.

The monitoring circuit checks K1 and K2 and that the reset circuit to X2 is both closed and opened before K1 and K2 are energized. Both the stop and reset function therefore comply with the requirement that a component fault, short circuit or external interference do not result in a dangerous function.

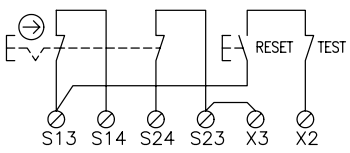
The safety outputs consist of contacts from K1 and K2 connected internally in series across terminals 13 - 14, 23 -24 and 33 - 34. These contacts are used to cut the power to components which stop or prevent hazardous movements/ functions. It is recommended that all switched loads are adequately suppressed and/or fused in order to provide additional protection for the safety contacts.

NOTE! Output 41-42 is intended for indication purposes only, e.g. gate opened.
No load between S14 and S24 allowed.

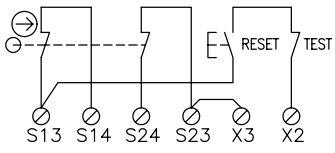
Technical data – JSBR4

Article number JSBR4 24 VDC JSBR4 24 VAC JSBR4 115 VAC JSBR4 230 VAC	 2TLA010002R0000 2TLA010002R0200 2TLA010002R0400 2TLA010002R0500
Colour	Black and beige
Power supply	24 VDC ± 15% 24/115/230 VAC ± 15%, 50 - 60 Hz
Power consumption	1.3 W/3.3 VA
Relay outputs	3 NO + 1 NC
Max. switching capacity Resistive load AC Inductive load AC Resistive load DC Inductive load DC	 6A/250 VAC/1500 VA AC15 240 VAC 2A 6A/24 VDC/150 W DC13 24 VDC 1A
Max. res. load total switching capacity	12A distributed on all contacts
Min. load	10mA/10 V (if load on contact has not exceeded 100 mA)
Contact material	Ag + Au flash
Fuses output (external)	5A gL/gG
Conditional short-circuit current (1 kA)	6A gG
Max. Input wire res. at nom. voltage	300 Ohm (S13 - S14 and S23 - S24)
Response time at deactivation	< 20 ms (145 ms at power loss)
Terminals (max. screw torque 1 Nm) Single strand: Conductor with socket contact:	 1 x 2.5 mm^2 / 2 x 1 mm^2. 1 x 4 mm^2 / 2 x 1.5 mm^2.
Mounting	35 mm DIN-rail
Protection class	IP40 / IP20 IEC 60529
Operating temperature range	-10°C to +55°C (with no icing or condensation)
Impulse withstand voltage	2.5kV
Pollution degree	2
Operating humidity range	35% to 85%
LED indication	Electrical Supply, Inputs, Outputs
Weight	350 g (24 VDC), 460 g (24-230 VAC)
Values (With Proof test interval 1 year)	Safety Category 4 according to EN 954-1, PL e, SIL 3, PFH_D 1.35E-08
Conformity	2006/42/EC, 2006/95/EC, 2004/108/EC,EN 62061:2005 EN ISO 13849-1:2008

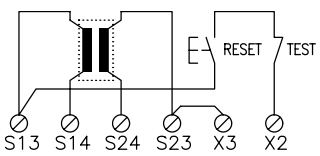
Electrical connection – JSBR4



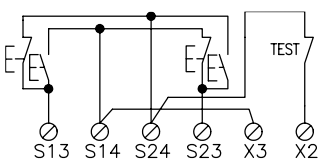
Emergency stop with manual resetting.



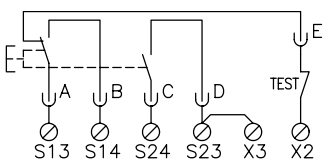
Interlocked gate with manual reset.



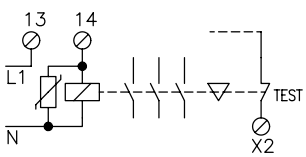
Contact mat/strip with manual reset.



Two hand device with buttons in separate or same enclosure. Buttons to be pressed in within 0.5 s of each other. Footpedal switches can be connected in the same configuration.



Enabling device, JSHD4. Stop condition is given in both top and bottom PB positions.



Control and supervision of external conductor, relay, valve or ABB Jokab Safety's expansion relays.

Safety relay
JSBT4

Approvals:

Safety relay for:

- Emergency stops
- Three position devices
- Interlocked Hatches
- Safety mats
- Contact strips
- Foot operated switches

Features:

- Dual input channels synchronism 0.5 s
- Test input
- Width 45 mm
- LED indications for power on, inputs and outputs
- 3 NO/1NC relay outputs
- Supply 24 VDC
- Quick release connector blocks

Safety relay with synchronised dual input channels (within 0.5s)

The JSBT4 has two inputs, both of which have to be closed in order to keep the safety output contacts closed. A short circuit between inputs A and B will cause the output contacts to open. The inputs can be continuously short circuited without damaging the safety relay.

For the outputs to close, the test input must be closed. The test input is intended to monitor that contactors or valves have dropped/returned before a new start is permitted.

This test input must not be confused with the reset function required for gates that a person can walk through and where there is a high safety requirement (see JSBR4).

If the JSBT4 is used for safety Mats and safety Strips, the "stop" condition is given following detection of a short circuit. The safety mat, safety strip or the relay will not be damaged by a continuous short-circuit. This also provides the advantage that if there is a failure between inputs A and B in the installation, the safety relay will not be damaged.

Safety level

The JSBT4 has a twin supervised safety function. Component failure, short-circuit or external disturbance (e.g. loss of power supply) will not prevent the safe function of the relay. Safety category level 3 or 4, depending on use.

The true two-channel safety function has the advantage that the cabling installation demands for safety can be reduced, due to the fact that a short-circuit between the inputs will directly open the relay's safety outputs.

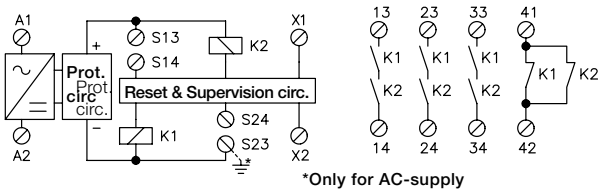
Regulations and standards

The JSBT4 is designed and approved in accordance with appropriate directives and standards. See technical data.

Connection examples

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

Technical description – JSBT4



The electrical supply is connected across A1 and A2. After Voltage reduction and Rectification (AC-versions) or reverse polarity protection (DC-version) there is an overload protection-circuit.

When the inputs S13-S14 and S23-S24 are closed within 0.5 seconds of each other the relays K1 and K2 are energized . A dual stop signal is given, K1 and K2 de-energize, when there is a short circuit between or an opening of the inputs or at power loss. If one input is opened the other one also has to be opened in order to activate K1 and K2 again. The test circuit, X1 - X2,has to be closed in order to activate the outputs, thereafter the test circuit can be opened or closed continously. If the test circuit is closed after the inputs there is no requirement to close them within 0.5 seconds of each other.

The internal supervision circuit monitors the two Inputs and relays K1, K2. The stop function then fulfils the requirement that one failure (short circuit, component, external disturbance) shall not prevent the safe function of the JSBT4.

The safety outputs consist of contacts from K1 and K2 connected internally in series across terminals 13 - 14, 23 -24 and 33 - 34. These contacts are used to cut the power to components which stop or prevent hazardous movements/ functions. It is recommended that all switched loads are adequately suppressed and/or fused in order to provide additional protection for the safety contacts.

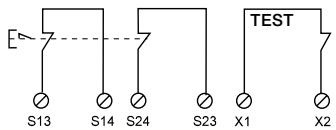
The NC output 41 - 42 should only be used for monitoring purposes e.g. Indication lamp or PLC input etc. The output contacts are closed until the module is reset.

NOTE! Output 41-42 is intended for indication purposes only, e.g. gate opened. No load between S14 and S24 allowed.

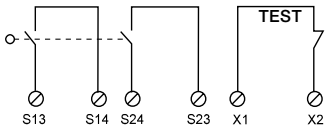
Technical data – JSBT4

Article number	
JSBT4 24 VDC	2TLA010004R0000
JSBT4 24 VAC	2TLJ010004R0200
JSBT4 230 VAC	2TLJ010004R0500
Colour	Grey
Power supply	24 VDC ±15%
Power consumption	BT50 1.4W/BT50T 1.8W
Relay outputs	3 NO + 1 NC
Max. switching capacity	
Resistive load AC	6A/250 VAC/1500 VA
Inductive load AC	AC15 240VAC 2A
Resistive load DC	6A/24 VDC/150 W
Inductive load DC	DC13 24VDC 1A
Max. res. load total switching capacity	12A distributed on all contacts
Min. load	10mA/10 V (if load on contact has not exceeded 100 mA)
Contact material	Ag + Au flash
Fuses output (external)	5A gL/gG
Conditional short-circuit current (1 kA)	6A gG
Max. Input wire res. at nom. voltage	300 Ohm (S13 - S14 and S23 - S24)
Response time at deactivation	< 20 ms, 145 ms with switched supply/power loss
Terminals (max. screw torque 1 Nm)	
Single strand	1x4 mm^2 / 2x1.5 mm^2
Conductor with socket contact	1x2.5 mm^2 / 2x1 mm^2
Mounting	35 mm DIN-rail
Protection class	IP40 / IP20 IEC 60529
Operating temperature range	-10°C to +55°C (with no icing or condensation)
Impulse withstand voltage	2.5kV
Pollution degree	2
Operating humidity range	35% to 85%
LED indication	Electrical Supply, Inputs, Outputs
Weight	350 g (24 VDC), 460 g (24-230 VAC)
Values (With Proof test interval 1 year)	Safety Category 4 according to, PL e, SIL 3, PFH_D 1.51E-08
Conformity	2006/42/EC, 2006/95/EC, 2004/108/EC, EN 62061:2005, EN ISO 13849-1:2008

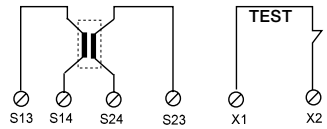
Electrical connection – JSBT4



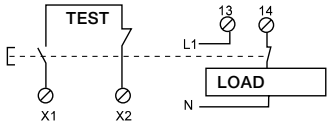
Emergency stop with automatic resetting.



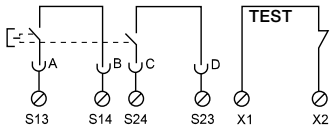
Interlocked hatch with automatic resetting.



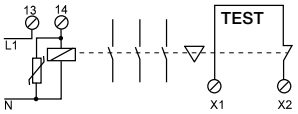
Contact mat/strip with automatic reset



Monitoring to ensure that the Start button cannot stick in pressed position. Short circuiting over the closing contact is not monitored. The RT-series and JSBR4 have built in short circuiting monitored resetting.



Enabling device, JSHD4. Stop condition is given in both top and bottom positions.



Control and supervision of external contactor, relay, valve or ABB Jokab Safety's expansion relays.

Safety relay/expansion relay
BT50(T)

Approvals:

Safety relay for:

- Emergency stop
- Interlocked hatch
- Expansion of Pluto

Features:

- Single and “dual” channel
- Test/”reset” input
- Width 22.5 mm
- LED indication
- 3 NO/1NC relay outputs
- Supply 24 VDC
- Quick release connector blocks
- BT50 - Additional power terminals
- BT50T - One changeover relay with a double information output (Y14)
- BT50T - Delay times selectable from 0 - 1.5 s

Safety relay/expansion relay to Pluto

The BT50 is designed to connect safety devices, such as emergency stops, directly in the voltage supply circuit to the relay. Despite a maximum built-in width of 22.5 mm the relay is very powerful.

With 3NO safety outputs, 1NC output (for monitoring purposes), a test input and complete internal supervision, the BT50 is quite unique. In addition, delayed outputs (BT50T) can be ordered.

In order for the safety outputs to close, the supply voltage, e.g. by means of an emergency stop button, must be connected to A1 and A2 and the test input closed. After actuation of the relay the test input can be opened again.

The test input is intended to supervise that contactors or valves have dropped/returned before a new start can be permitted.The test input can also be used for starting and the start button can be supervised (see the connection example on the next page).

More outputs

By connecting a BT50 to a safety relay/PLC it is easy to increase the number of safe outputs. This means that an unlimited number of dangerous machine operations and functions can be stopped by using just one safety-PLC.

Safety level

BT50 have an internal redundant and monitored safety function. Power failure, internal component faults or external interference cannot result in dangerous functions.

Input via A1 on its own is not protected from short circuiting, and therefore installation is critical for the safety level to be achieved. To achieve a higher safety level a screened cable can be used and/or connection made to both A1 and A2 (see the example on the next page).

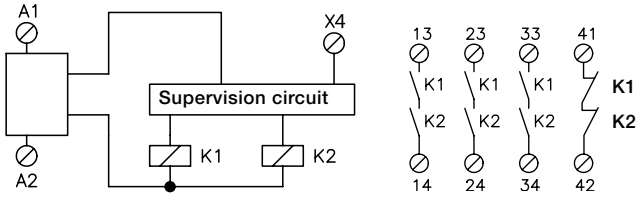
Regulations and standards

The BT50 is designed and approved in accordance with appropriate directives and standards. See technical data.

Connection examples

For examples of how our safety relays can solve various safety problems, please see the chapter “Connection examples”.

Technical description – BT50(T)



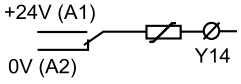
When supply voltage is connected to A1 and A2, relays K1 and K2 are activated. K1 and K2 drop if the supply voltage is disconnected. Both relays K1 and K2 must drop for them to be activated again. Another requirement is that the test circuit, A1 - X4, must be closed for the outputs to be activated. Thereafter A1 - X4 can either be open or constantly closed.

The supervising circuit ensures that both K1 and K2 have dropped before they can be reactivated. The stop function complies with the requirement that a component fault or external interference cannot lead to a dangerous function.

The safety outputs consist of contacts from K1 and K2 connected internally in series across terminals 13 - 14, 23 - 24, and 33 - 34. These contacts are used to cut the power to components which stop or prevent hazardous movements/functions. It is recommended that all switched loads are adequately suppressed and/or fused in order to provide additional protection for the safety contacts.

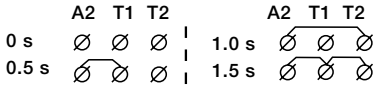
The NC output 41 - 42 should only be used for monitoring purposes e.g. indication lamp for emergency stop pressed.

BT50T - Info. output



Max load 250 mA

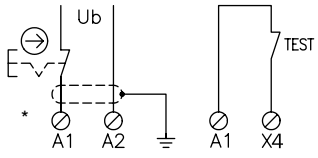
BT50T - Delay times



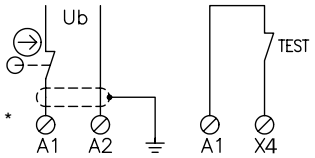
Technical data – BT50(T)

Article number BT50 BT50T	 2TLA010033R0000 2TLA010033R1000
Colour	Black and beige
Operational voltage	24 VDC + 15%/-25%
Power consumption	BT51 1.4W/BT51T
Relay outputs	3 NO + 1 NC
Max. switching capacity Resistive load AC Inductive load AC Resistive load DC Inductive load DC	 6A/250 VAC/1500 VA AC15 240 VAC 2A 6A/24 VDC/150 W DC13 24 VDC 1A
Max. res. load total switching capacity	12A distributed on all contacts
Min. load	10mA/10 V(if load on contact has not exceeded 100 mA)
Contact material	Ag + Au flash
Fuses output (external)	5A gL/gG
Conditional short-circuit current (1 kA)	6A gG
Max Input wire res. at nom. voltage	200 Ohms
Response time at deactivation (input - output)	Version B <20 ms or delayed max 1500 ms (old version of BT50 <60 ms)
Terminals (max. screw torque 1 Nm) Single strand Conductor with socket contact	 2x1.5 mm^2 2x1 mm^2
Mounting	35 mm DIN-rail
Protection class enclosure/terminals	IP40 / IP20 IEC 60529
Impulse withstand voltage	2.5kV
Pollution degree	2
Operating temperature range	-10°C to +55°C (with no icing or condensation)
Operating humidity range	35% to 85%
LED indication	Electrical Supply, Relay and X4
Weight	200 g
Performance (max.) Functional test: The relays must be cycled at least once a year.	PL e/Cat. 4 (EN ISO 13849-1:2008) SIL 3 (EN 62061:2005) PFH_D 1.22E-08

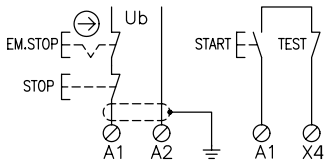
Electrical connection – BT50(T)



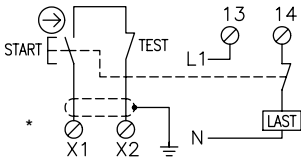
Emergency stop with reset when emergency button returns.



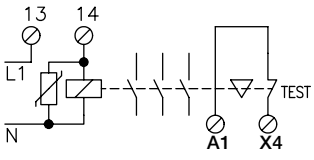
Hatch with automatic reset.



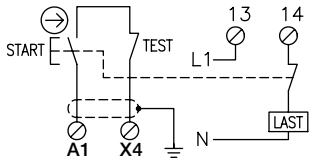
BT50 as emergency stop and control relay with Start and Stop function.



Emergency stop with dual connection direct to the supply voltage.



Controlled monitoring of external contactor, relay, valve or ABB Jokab Safety's expansion relays.



Monitoring to ensure that the On button is not stuck in pressed position. A short circuit over the closing contact is not monitored.

* BT50 has additional power terminals A1 and A2.

Safety relay/expansion relay
BT51(T)

Approvals:

Safety relay for:

- Emergency stop
- Interlocked hatch
- Expansion of Pluto

Features:

- Single and “dual” channel
- Test/”reset” input
- Width 22.5 mm
- LED indication
- 4 NO relay outputs
- Supply 24 VDC
- Quick release connector blocks
- BT51 - Additional power terminals
- BT51T - One changeover relay with a double information output (Y14)
- BT51T - Delay times selectable from 0 - 1.5 s

Safety relay/expansion relay to Pluto

The BT51 is designed to connect safety devices, such as emergency stops, directly in the voltage supply circuit to the relay. Despite a maximum built-in width of 22.5 mm the relay is very powerful.

With 4 NO safety outputs, test input and complete internal supervising, the BT51 is quite unique. In addition you can order delayed outputs (BT51T).

In order for the safety outputs to close, the supply voltage, e.g. by means of an emergency stop button, must be connected to A1 and A2 and the test input closed. After actuation of the relay the test input can be opened again.

The test input is intended to supervise that contactors or valves have dropped/returned before a new start can be permitted.The test input can also be used for starting and the start button can be supervised (see connection example on next page).

More outputs

By connecting BT51 to a safety relay/PLC it is easy to increase the number of safe outputs. This means that an unlimited number of dangerous machine operations and functions can be stopped from one safety relay/PLC.

Safety level

BT50 has an internal redundant and monitored safety function. Power failure, internal component faults or external interference cannot result in dangerous functions.

Input via A1 only is not protected from short circuiting, and therefore installation is critical for the safety level to be achieved. To achieve a higher safety level a screened cable can be used and/or connection made to both A1 and A2 (see example overleaf).

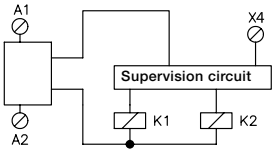
Regulations and standards

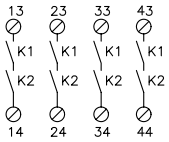
The BT51 is designed and approved in accordance with appropriate directives and standards. See technical data.

Connection examples

For examples of how our safety relays can solve various safety problems, please see the chapter “Connection examples”.

Technical description – BT51(T)



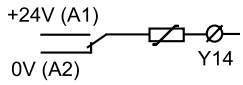


When supply voltage is connected to A1 and A2, relays K1 and K2 are activated. K1 and K2 drop if the supply voltage is disconnected. Both relays K1 and K2 must drop for them to be activated again. Another requirement is that the test circuit, A1 - X4, must be closed for the outputs to be activated. Thereafter A1 - X4 can either be open or constantly closed.

The supervising circuit ensures that both K1 and K2 have dropped before they can be reactivated. The stop function complies with the requirement that a component fault or external interference cannot lead to a dangerous function.

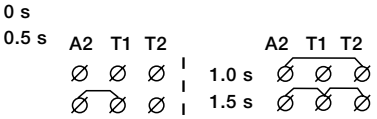
The safety outputs consist of contacts from K1 and K2 connected internally in series across terminals 13 - 14, 23 - 24, 33 - 34 and 43 - 44. These contacts are used to cut the power to components which stop or prevent hazardous movements/functions. It is recommended that all switched loads are adequately suppressed and/or fused in order to provide additional protection for the safety contacts.

BT51T - Info. output



Max load 250 mA

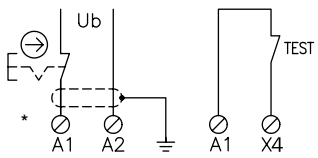
BT51T - Delay times



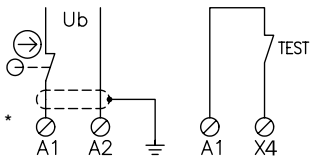
Technical data – BT51(T)

Article number BT51 BT51T	 2TLA010033R2000 2TLA010033R3000
Colour	Grey
Operational voltage	24 VDC + 15%/-25%
Power consumption	1.4 W/1.8 W
Relay Outputs	4 NO
Max. switching capacity Resistive load AC Inductive load AC Resistive load DC Inductive load DC	 6A/250 VAC/1500 VA AC15 240 VAC 2A 6A/24 VDC/150 W DC13 24 VDC 1A
Max. res. load total switching capacity	12 A distributed on all contacts
Min. load	10mA/10 V (if load on contact has not exceeded 100 mA
Contact material	Ag + Au flash
Fuses Output (External)	5A gL/gG
Conditional short-circuit current (1 kA)	6A gG
Max Input Wire res. at nom. voltage	200 Ohms
Response time at deactivation	<20 ms or delayed max 1500 ms (BT51T)
Terminals (Max. screw torque 1 Nm) Single strand: Conductor with socket contact:	 2x1.5 mm^2 2x1 mm^2
Mounting	35 mm DIN-rail
Protection class enclosure/terminals	IP40 / IP20 IEC 60529
Impulse Withstand Voltage	2.5kV
Pollution Degree	2
Operating temperature range	-10°C to +55°C (with no icing or condensation)
Operating humidity range	35% to 85%
LED indication	Electrical Supply, Relay and X4
Weight	200 g
Performance (max.) Functional test: The relays must be cycled at least once a year.	 PL e/Cat. 4 (EN ISO 13849-1:2008) SIL 3 (EN 62061:2005) PFH_D 1.63E-08
Conformity	2006/42/EC, 2006/95/EC, 2004/108/EC, EN 62061:2005 EN ISO 13849-1:2008

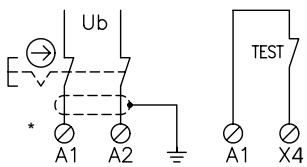
Electrical connection – BT51(T)



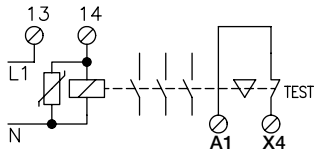
Emergency stop with reset when emergency button returns.



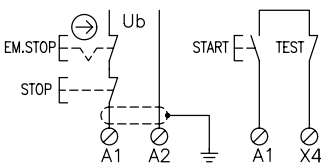
Hatch with automatic reset.



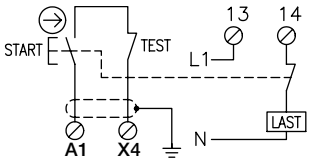
Emergency stop with dual connection direct to the supply voltage.



Controlled monitoring of external contactor, relay, valve or ABB Jokab Safety's expansion relays.



BT51 as emergency stop and control relay with Start and Stop function.



Monitoring to ensure that the On button is not stuck in pressed position. A short circuit over the closing contact is not monitored.

* BT51 has additional power terminals A1 and A2.

Safety relay
JSBT5(T)

Approvals:

Safety relay for:

- Emergency stop
- Interlocked hatch

Features:

- Single and “dual” channel
- Test/start input
- Width 22.5 mm
- LED indication
- 3 NO/1NC relay outputs
- (T) = delayed outputs 0.5 sec.
- Supply 12 VDC, 24 VDC/AC

Single channel safety relay

The JSBT5 is designed to connect safety devices, such as emergency stops, directly in the voltage supply circuit to the relay. Despite a maximum built-in width of 22.5 mm the relay is very powerful.

With 3 NO safety outputs, 1 NC, test input and complete internal supervising, the JSBT5 is quite unique. In addition you can order delayed outputs (JSBT5T).

In order for the safety outputs to close, the supply voltage, e.g. by means of an emergency stop button, must be connected to A1 and A2 and the test input closed. After actuation of the relay the test input can be opened again.

The test input is intended to supervise that contactors or valves have dropped/returned before a new start can be permitted.The test input can also be used for starting and the start button can be supervised (see connection example on next page).

Safety level

The JSBT5 has a twin and supervised internal safety function. Power failure, internal component faults or external interference cannot result in dangerous functions.

Input via A1 only is not protected from short circuiting, and therefore installation is critical for the safety level to be achieved. To achieve a higher safety level a screened cable can be used and/or connection made to both A1 and A2 (see example overleaf).

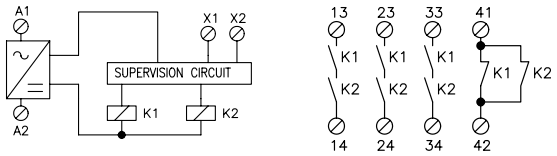
Regulations and standards

The JSBT5 is designed and approved in accordance with appropriate directives and standards. See technical data.

Connection examples

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

Technical description – JSBT5(T)

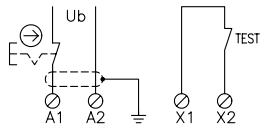


When supply voltage is connected to A1 and A2, relays K1 and K2 are activated. K1 and K2 drop if the supply voltage is disconnected. Both relays K1 and K2 must drop for them to be activated again. Another requirement is that the test circuit, X1 - X2, must be closed for the outputs to be activated. Thereafter X1 - X2 can either be open or constantly closed. The supervising circuit ensures that both K1 and K2 have dropped before they can be reactivated. The stop function complies with the requirement that a component fault or external interference cannot lead to a dangerous function.

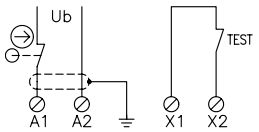
The safety outputs consist of contacts from K1 and K2 connected internally in series across terminals 13 - 14, 23 - 24, and 33 - 34. These contacts are used to cut the power to components which stop or prevent hazardous movements/functions. It is recommended that all switched loads are adequately suppressed and/or fused in order to provide additional protection for the safety contacts.

The NC output 41 - 42 should only be used for monitoring purposes e.g. indication lamp for emergency stop pressed.

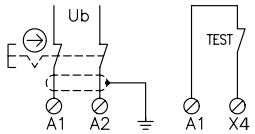
Electrical connection – JSBT5(T)



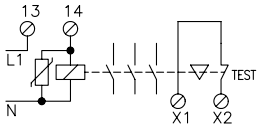
Emergency stop with automatic reset when emergency button returns.



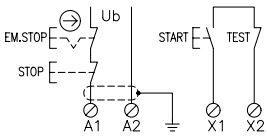
Hatch with automatic reset.



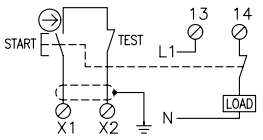
Emergency stop with dual connection direct to the supply voltage.



Controlled monitoring of external contactor, relay, valve or ABB Jokab safety's expansion relays.



JSBT5 as emergency stop and control relay with Start and Stop function.



Monitoring to ensure that the On button is not stuck in pressed position. A short circuit over the closing contact is not monitored. The JSBR4 has built in short circuit monitored resetting.

Technical data – JSBT5(T)

Article number JSBT5 24 VAC/VDC JSBT5 12 VDC JSBT5T 24 VAC/VDC	 2TLA010005R0100 2TLA010005R0700 2TLA010005R1100
Colour	Grey
Operational voltage JSBT5: JSBT5T:	 24 VDC/AC + 15%–25%, 50–60 Hz 12 VDC, 24 VDC/AC + 15% – 25%, 50 - 60 Hz
Power consumption	1 W/1.9 VA
Relay Outputs	3 NO + 1 NC
Max. switching capacity Resistive load AC Inductive load AC Resistive load DC Inductive load DC	 6A/250 VAC/1500 VA AC15 240 VAC 2A 6A/24 VDC/150 W DC13 24 VDC 1A
Max. res. load total switching capacity:	9A distributed on all contacts
Min. load	10mA/10 V (if load on contact has not exceeded 100 mA)
Contact material	AgCuNi
Fuses Output (External)	5A gL/gG
Conditional short-circuit current (1 kA)	6A gG
Max Input Wire res. at nom. voltage	200 Ohm
Response time at deactivation	<60 ms or delayed max 500 ms (JSBT5T)
Terminals (Max. screw torque 1 Nm) Single strand: Conductor with socket contact:	 2x1.5 mm^2 2x1 mm^2
Mounting	35 mm DIN-rail
Protection class enclosure/terminals	IP40 / IP20 IEC 60529
Impulse Withstand Voltage	2.5kV
Pollution Degree	2
Operating temperature range	-10°C to +55°C (with no icing or condensation)
Operating humidity range	35% to 85%
Function indication	Electrical Supply
Weight	200 g
Performance (max.) Functional test: The relays must be cycled at least once a year.	PL e/Cat. 4 (EN ISO 13849-1:2008) SIL 3 (EN 62061:2005) PFH_D 1.22E-08
Conformity	2006/42/EC, 2006/95/EC, 2004/108/EC, EN 62061:2005 EN ISO 13849-1:2008

Safety timer
JSHT1

Approvals:

CE TÜV NORD cULus

Safety relay for:

- Time reset
- Time bypassing

Features:

- Hardwire time selection 5 – 40 s
- Selectable single or dual channel input
- Test input
- Width 45 mm
- LED indication for supply, inputs and outputs
- 1+1 NO relay outputs
- Supply 24 VDC
- Quick release connector blocks

The JSHT1A/B closes two independent relay outputs during a guaranteed maximum time when the inputs are opened.

Time reset

Time reset can prevent unintentional reset of safety systems when someone is still in the dangerous area of the machine. During a guaranteed maximum time, one or several PB´s for reset must be activated. The reset buttons should be sited in such a way that operatives have a clear overview of the whole area which is guarded. Time reset is made by the combination of a safety relay and the timer relay JSHT1A/B.

Time bypassing

The JSHT1 can also be used for time bypass of light beams for e.g. autotruck into a dangerous area.

Operation

When the inputs open the output contacts close. The output contacts open when the inputs close or when the time period has expired. The time period is hardwire selectable on terminals T1, T2 and T3. The time given is the maximum time. One or two channel operation is also hardwire selectable.

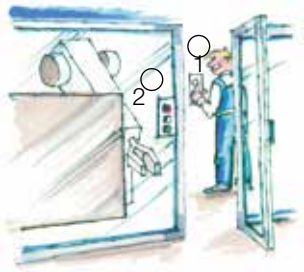
Regulations and standards

The JSHT1A/B is designed and approved in accordance with appropriate directives and standards. See technical data.

Connection examples

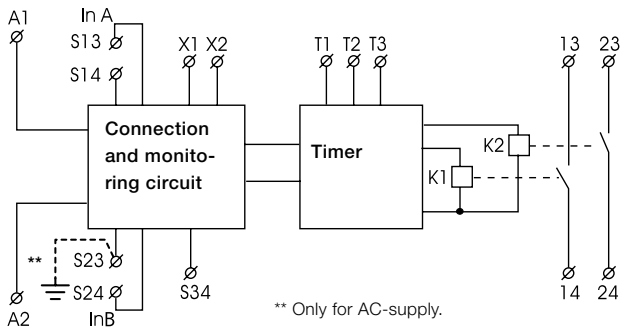
For examples of how our safety relays can solve various safety problems, please see the section “Connection examples”.

Light beam being bypassed for a maximum pre-set time e.g. 5 sec. by the jsht1 during entrance and exit with the JSHD4 Three Position Enabling device.



Time reset procedure. First push PB1, then exit dangerous area and close the door, then push PB2 (PB1 and PB2 must be pressed within the predetermined time period selected). After this procedure the machine can be safely restarted.

Technical description – JSHT1 A/B

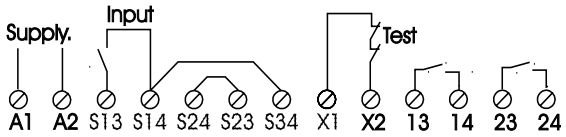


The electrical supply is connected across A1 and A2. The internal supervising circuit is activated directly when the supply is on. The inputs A and B must both be closed and then opened. Thereafter K1 and K2 are activated and the outputs close. K1 and K2 are activated for the hardwired selected time (set by connections on the terminals T1, T2 and T3). If there is a short circuit between the inputs or the inputs are closed again before the set time period has expired the outputs will open. In order to close the outputs again both the inputs have to be closed and both internal relays K1 and K2 deactivated (controlled by the supervising circuit) and the inputs again opened.

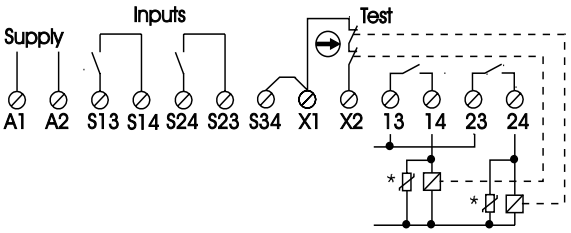
By external hardwire connections the JSHT1 can be made single or dual channel input. See figure below.

Electrical connection – JSHT1 A/B

Connection for single channel input

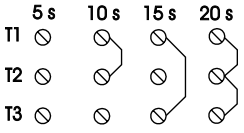


Connection for dual channel input

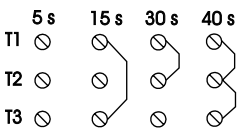


Selection of time by hardwire links

JSHT1A



JSHT1B



* It is recommended that all switched loads are adequately suppressed and/or fused in order to provide additional protection for the safety contacts. In the figure the monito-ring of two contactors in the test input is shown.

Technical data – JSHT1 A/B

Article number	
JSHT1A 24 VDC	2TLA010011R0000
JSHT1B 24 VDC	2TLA010011R1000
Colour	Grey
Power supply	24 VDC ±15 %
Power consumption	1.8 W/3.7 VA
Max Input wire res. at nom voltage/ channel	100/200 Ohm (1 Channel/ 2 Channel)
Response time at activation	<30ms
Response time at deactivation	< 15 ms
Selectable time (± 15 % at nom. V.)	JSHT1A: 5-10-15-20 sec
	JSHT1B: 5-15-30-40 sec
Relay outputs	2 x 1 NO
Max. switching capacity resistive load AC	4A/250 VAC/1000 VA
Inductive load AC	AC15 250 VAC 3A
Resistive load DC	4A/24 VDC/100 W
Inductive load DC	DC13 24 VDC 2A
Max. total switching capacity:	8A distributed on all contacts
Min. load	10mA/10 V (if load on contact has not exceeded 100 mA)
Contact material	AgCuNi
Fuses output (external)	3A gL/gG or 4A fast
Conditional short-circuit current (1 kA)	6A gG
Max input wire res. at nom. voltage	100 Ohm
Terminals (max. screw torque 1 Nm)	
Single strand	1x4 mm^2, 2x1.5 mm^2
Conductor with socket contact	1x2.5 mm^2, 2x1 mm^2
Mounting	35 mm DIN-rail
Protection class enclosure/termi-nals	IP20 / IP40 IEC 60529
Impulse withstand voltage	2.5kV
Pollution degree	2
Operating temperature range	–10°C to +55°C (with no icing or condensation)
Operating humidity range	35% to 85%
LED indication	Electrical Supply, Inputs, Outputs
Weight	24 VDC: 330 g
	24/48/115/230 VAC: 430 g
Performance (max.)	
Functional test: The relays must be cycled at least once a year.	PL e/Cat. 4 (EN ISO 13849-1:2008) SIL 3 (EN 62061:2005) PFH_D 4.42E-09
Conformity	2006/42/EC, 2006/95/EC, 2004/108/EC
	EN 62061:2005
	EN ISO 13849-1:2008

Safety timer
JSHT2

Approvals:

Safety relay for:

- Time bypassing
- Inching

Features:

- Hardwire time selection
- 0.2 – 40 s
- Selectable single or dual channel input
- Test input
- Width 45 mm
- LED indication for supply, inputs and outputs
- 1+1 NO relay outputs
- Supply 24 VDC
- Quick release connector blocks

The JSHT2A/B/C closes two independent relay outputs during a guaranteed maximum period of time when the inputs are closed.

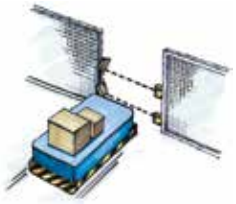
Time bypassing
Sensors detect the autocarrier and are connected to the JSHT2 which supervises the sensors and bypasses the light beam for a maximum predetermined time.

Inching
Inching applications require safety outputs to be closed for a predetermined maximum period of time, allowing the machine to move only a short distance each time the inching control is activated. For each new motion the inching control e.g. PB or pedal must be released and activated again.

Operation
When the inputs close the output contacts close. The output contacts open when the input opens or when the time period has expired. The time is hardwire selectable on the terminals T1, T2 and T3. The time given is the maximum time. Single or dual channel operation is also hardwire selectable.

Regulations and standards
The JSHT2A/B/C is designed and approved in accordance with appropriate directives and standards. See technical data.

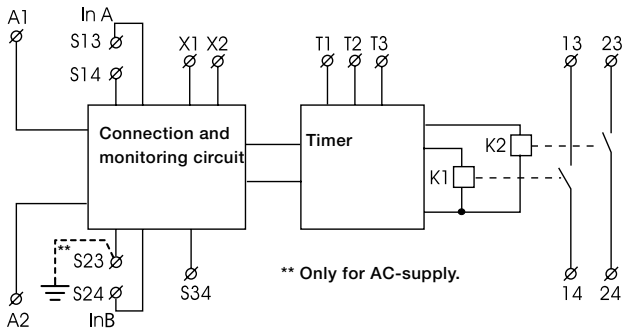
Connection examples
For examples of how our safety relays can solve various safety problems, please see the section “Connection examples”.



Light beam being bypassed only for the time it takes the autocarrier to pass.

Shaft only turns a small amount each time the PB is pressed.

Technical description – JSHT2 A/B/C

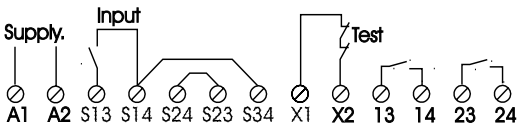


The electrical supply is connected across A1 and A2. The internal supervising circuit is activated directly when the supply is on. The inputs A and B must both be opened and then closed. Thereafter K1 and K2 are activated and the outputs close. K1 and K2 are activated for hardwired selected time (set by connections on the terminals T1, T2 and T3). If there is a short circuit between the inputs or the inputs are opened again before the set time period has expired the outputs will open. In order to close the outputs again both the inputs have to be opened and both internal relays K1 and K2 deactivated (controlled by the supervising circuit) and then the inputs closed again.

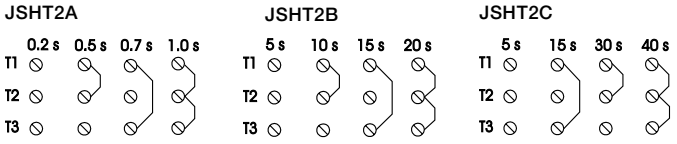
By external hardwire connectors the JSHT2 can be made to operate from either single or dual channel inputs. See figure below.

Electrical connection – JSHT2 A/B/C

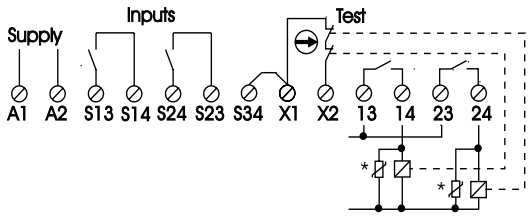
Connection for single channel input



Selection of time by hardwire links



Connection for dual channel input



* It is recommended that all switched loads are adequately suppressed and/or fused in order to provide additional protection for the safety contacts. In the figure the monitoring of two contactors in the test input is shown.

Technical data – JSHT2 A/B/C

Article number	
JSHT2A 240 VDC	2TLA010012R0000
JSHT2B 24 VDC	2TLA010012R1000
JSHT2C 24 VDC	2TLA010012R2000
Colour	Grey
Power supply	24 VDC ±15 %
Power consumption	1.8 W/3.8 VA
Max input wire res. at nom voltage/channel	100/200 Ohm (1 Channel/ 2 Channel)
Response time at activation	< 30 ms
Response time at deactivation	< 15 ms
Selectable time (± 15 % at nom. V.)	JSHT2A: 0.2 - 0.5 - 0.7 - 1.0 sec JSHT2B: 5 - 10 - 15 - 20 sec JSHT2C: 5 - 15 - 30 - 40 sec
Relay outputs	2 x 1 NO
Max. switching capacity	
Resistive load AC	4A/250 VAC/1000 VA
Inductive load AC	AC15 250VAC 3A
Resistive load DC	4A/24 VDC/100 W
Inductive load DC	DC13 24VDC 2A
Max. total switching capacity:	8A distributed on all contacts
Min. load	10mA/10 V (if load on contact has not exceeded 100 mA)
Contact material	AgCuNi
Fuses output (external)	3A gL/gG or 4A fast
Max input wire res. at nom. voltage	100 Ohm
Terminals (max. screw torque 1 Nm)	
Single strand:	1x4 mm^2 or 2x1.5 mm^2
Conductor with socket contact:	1x2.5 mm^2 or 2x1 mm^2
Mounting	35 mm DIN-rail
Protection class	IP20 / IP40 IEC 60529
Impulse withstand voltage	2.5kV
Pollution degree	2
Operating temperature range	–10°C to +55°C (with no icing or condensation)
Operating humidity range	35% to 85%
LED indication	Electrical Supply, Inputs, Outputs
Weight	24 VDC: 310 g 24/48/115/230 VAC: 410 g.
Performance (max.)	
Functional test: The relays must be cycled at least once a year.	PL e/Cat. 4 (EN ISO 13849-1:2008) SIL 3 (EN 62061:2005) PFH_D 4.42E-09
Conformity	2006/42/EC, 2006/95/EC, 2004/108/EC EN 62061:2005 EN ISO 13849-1:2008

Expansion relay
E1T

Approvals:

Safety relay for:

- More safety outputs
- Delayed safety outputs

Features:

- Width 22.5 mm
- Supply 24 VDC
- LED output indication
- 4 NO relay outputs
- Single or dual channel operation option
- Quick release connector blocks

More outputs
By connecting expansion relays to a safety relay it is easy to increase the number of safe outputs. This means that an unlimited number of dangerous machine operations and functions can be stopped from one safety relay.

Safe soft stop
When a gate is opened a program stop is first given to the machine's PLC/servo which brakes the dangerous operations in a soft and controlled way. The safety outputs then break the power to the motors, that is, when the machine has already stopped. Normally between 0.5 and 1 second is needed to brake a dangerous machine operation softly.

Soft stop ensures many advantages:
- The machine lasts longer.
- Parts being processed are not damaged.
- Restart from stopped position is enabled and simplified.

A safe soft stop is achieved by means of a safety relay which gives the program stop, and an expansion relay, E1T, which gives safe delayed stop signals. See section "Connection examples". The drop time delay on a E1T can as standard be selected from 0 to 3 seconds. By connecting several E1T´s in series even longer times can be achieved.

When are delayed safe stops used?
Delayed safety stop signals can be used for emergency stops according to EN ISO 13850:2008 § 4.1.4. Stop category 1, i.e. a controlled stop with power to the actuator(s) available to achieve the stop and then removal of power when stop is achieved.

Stop category 1 may also be permitted when it is not possible to gain physical access to the machine before the safe stop is affected e.g:
- Gates, access time is normally over 1 sec.
- Covers and gates which are locked until dangerous operations and functions have been stopped.
- Long distances between a safety device and a dangerous machine function.

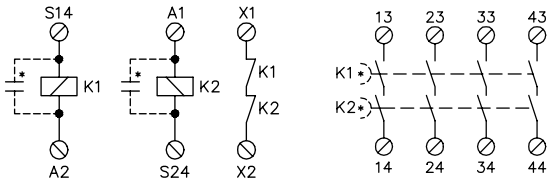
Safety level
The E1T has twin stop functions, that is, two relays with mechanically operated contacts. A monitored stop function is achieved by connecting the test output (terminals X1 and X2) to the test or reset input on the safety relay which is being expanded.

One condition for a safe delayed stop is that the delay time cannot increase in the event of a fault. The E1T complies with this requirement.

Regulations and standards
The E1T is designed and approved in accordance with appropriate directives and standards. See technical data.

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

Technical description – E1T



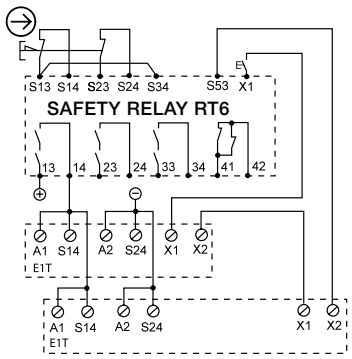
The E1T has to be connected to a safety relay in order to fulfill the necessary safety requirements (see connection examples below). The safety relay controls and monitors the E1T (The E1T can be connected for single or dual channel operation - see below). When the inputs S14 and S24 close, relays K1 and K2 are activated. A stop signal is given, K1 and K2 drop, if the inputs are opened or during power failure. K1 and K2 drop either directly or after a delay* (if incorporated). Delay time of module is fixed and shown on front panel of device. The delay circuit is so arranged that the design time cannot be exceeded.

To check that both the relays K1 and K2 drop during a stop signal they must be monitored. This is achieved by connecting X1 and X2 to the test or reset input on the safety relay which is expanded (see below). K1 and K2 are mechanically operated relays, therefore, if one of the output contacts should stick closed then the relay's contact in X1-X2 cannot be closed thus preventing a new ready signal being given to the safety relay.

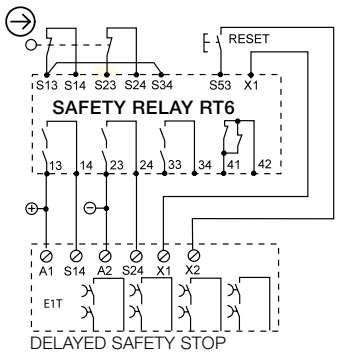
Inductive loads should be equipped with an arc suppressor to protect the output contacts.

Diodes are the best arc suppressors but will increase the switch off time of the load.

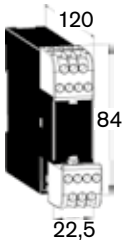
Electrical connection – E1T



Single channel expansion of outputs for a safety relay connected to an emergency stop.



Dual channel expansion with delayed safety outputs for a safety relay monitoring a gate.



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

Technical data – E1T

Article number	
E1T 0 s 24 VDC	2TLA010030R0000
E1T 0.5 s 24 VDC	2TLA010030R1000
E1T 1 s 24 VDC	2TLA010030R2000
E1T 1.5 s 24 VDC	2TLA010030R3000
E1T 2 s 24 VDC	2TLA010030R4000
E1T 3 s 24 VDC	2TLA010030R5000
Colour	Grey
Operational voltage	24 VDC ± 15%
Power consumption	1.5 W
Relay Outputs	4 NO
Max. switching capacity	
Resistive load AC	6A/250 VAC/1500VA
Inductive load AC	AC15 240 VAC 2A
Resistive load DC	6A/24 VDC/150W
Inductive load DC	DC13 24 VDC 1A
Max. total switching capacity	12A distributed on all contacts
Min. switching load	10 mA/10 V (if load on contact has not exceeded 100 mA)
Contact material	Ag + Au flash
Fuses output (external)	5A gL/gG
Conditional short-circuit current (1 kA)	6A gG
Maximum external resistance at a nominal voltage	150 Ohm (S14, S24)
Response time at deactivation (input - output)	< 0,020 s, 0,5 s, 1 s, 1,5 s, 2 s, 3 s, ± 20%
Response time at activation (input-output)	<30 ms
Terminals (max. screw torque 1 Nm)	
Single strand:	1x4 mm^2 / 2x1.5 mm^2
Conductor with socket contact:	1x2.5 mm^2 / 2x1 mm^2
Mounting	35 mm DIN-rail
Protection class	
enclosure	IP40 IEC 60529
terminals	IP20 IEC 60529
Impulse withstand voltage	2.5kV
Pollution degree	2
Operating temperature range	-10°C – +55°C (with no icing or condensation)
Operating humidity range	35% to 85%
LED indication	Output status
Weight	220 g
Performance (max.)	PL e/Cat. 4
Functional test: The relays must be cycled at least once a year.	(EN ISO 13849-1:2008) SIL 3 (EN 62061:2005) PFH_D 1.55E-08
Conformity	2006/42/EC, 2006/95/EC, 2004/108/EC EN 62061:2005 EN ISO 13849-1:2008

Expansion relay
JSR1T

Approvals:

Safety relay for:

- More safe outputs
- Delayed safe outputs
- Information output

Features:

- Width 45 mm
- Supply 24 VDC
- LED function indication
- 4 NO/1 NC relay outputs
- Single and dual channel
- Quick release connector blocks

More outputs
By connecting expansion relays to a safety relay it is easy to increase the number of safe outputs. This means that an unlimited number of dangerous machine operations and functions can be stopped from one safety relay.

Safe soft stop
When a gate is opened a program stop is first given to the machine's PLC/servo which brakes the dangerous operations in a soft and controlled way. The safety outputs then break the power to the motors, that is, when the machine has already stopped. Normally between 0.5 and 1 second is needed to brake a dangerous machine operation softly.

Soft stop ensures many advantages:
- The machine lasts longer.
- Parts being processed are not damaged.
- Restart from stopped position is enabled and simplified.

A safe soft stop is achieved by means of a safety relay which gives the program stop, and an expansion relay, JSR1T, which gives safe delayed stop signals. See section "Connection examples". The drop time delay on a JSR1T can as standard be selected from 0 to 10 seconds. By connecting several JSR1T´s in series even longer times can be achieved.

When are delayed safe stops used?
Delayed safety stop signals can be used for emergency stops according to EN418 § 4.1.4 Stop category 1, i.e. a controlled stop with power to the actuator(s) available to achieve the stop and then removal of power when stop is achieved.

Stop category 1 may also be permitted when it is not possible to gain physical access to the machine before the safe stop is affected e.g:
- Gates, access time is normally over 1 sec.
- Covers and gates which are locked until dangerous operations and functions have been stopped.
- Long distances between a safety device and a dangerous machine function.

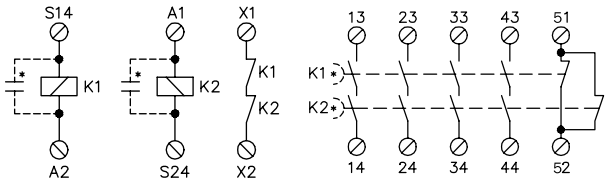
Safety level
The JSR1T has twin stop functions, that is, two relays with mechanically operated contacts. A monitored stop function is achieved by connecting the test output (terminals X1 and X2) to the test or reset input on the safety relay which is being expanded.

One condition for a safe delayed stop is that the delay time cannot increase in the event of a fault. The JSR1T complies with this requirement.

Regulations and standards
The JSR1T is designed and approved in accordance with appropriate directives and standards. See technical data.

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

Technical description – JSR1T



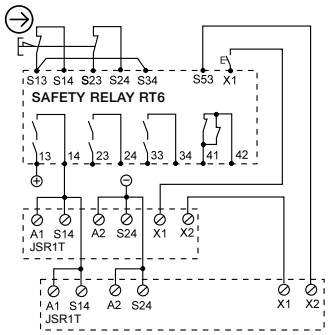
The JSR1T has to be connected to a safety relay in order to fulfill the necessary safety requirements (see connection examples below). The safety relay controls and monitors the JSR1T. (The JSR1T can be connected for single or dual channel operation - see below). When the inputs S14 and S24 close, relays K1 and K2 are activated. A stop signal is given, K1 and K2 drop, if the inputs are opened or during power failure. K1 and K2 drop either directly or after a delay* (If incorporated). Delay time of module is fixed and shown on front panel of device. The delay circuit is so arranged that the design time cannot be exceeded.

To check that both the relays K1 and K2 drop during a stop signal they must be monitored. This is achieved by connecting X1 and X2 to the test or reset input on the safety relay which is expanded (see below). K1 and K2 are mechanically operated relays, therefore, if one of the output contacts should stick closed then the relay's contact in X1-X2 cannot be closed thus preventing a new ready signal being given to the safety relay.

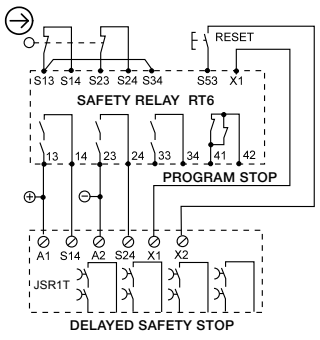
Inductive loads should be equipped with an arc suppressor to protect the output contacts.

Diodes are the best arc suppressors but will increase the switch off time of the load.

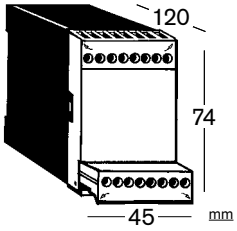
Electrical connection – JSR1T



Expansion of outputs for safety relay connected to emergency stop with automatic reset.



Dual-channel expansion with delayed safety outputs for safety relay monitoring a gate.



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

Technical data – JSR1T

Article number	
JSR1T 0	2TLA010015R0000
JSR1T 1.5	2TLA010015R0500
JSR1T 8	2TLA010015R0600
JSR1T 0.5	2TLA010015R1000
JSR1T 10s	2TLA010015R2000
JSR1T 1	2TLA010015R3000
JSR1T 2	2TLA010015R4000
JSR1T 3	2TLA010015R5000
JSR1T 5	2TLA010015R6000
Colour	Grey
Power supply	24 VDC ±15%
Power consumption	1.2 W
Relay outputs	4 NO + 1 NC
Max. switching capacity	
Resistive load AC	6A/250 VAC/1500 VA
Inductive load AC	AC15 240 VAC 2A
Resistive load DC	6A/24 VDC/150 W
Inductive load DC	DC13 24 VDC 1A
Max. total switching capacity:	16A distributed on all contacts
Min. load	10mA/10 V (if load on contact has not exceeded 100 mA)
Contact material	Ag + Au flash
Fuses output (external)	5A gL/gG
Conditional short-circuit current (1 kA)	6A gG
Max. Input wire res. at nom. voltage	150 Ohm (S14, S24)
Response time at deactivation (input- output)	< 0.020 s, 0.5 s, 1 s, 1.5 s, 2 s, 3 s, 5 s, 8 s, 10 s ± 20 %
Terminals (max. screw torque 1 Nm)	
Single strand:	1x2.5 mm^2 / 2x1 mm^2
Conductor with socket contact:	1x4 mm^2 / 2x1.5 mm^2
Mounting	35 mm DIN-rail
Protection class enclosure/terminals	IP40 / IP20 IEC 60529
Impulse withstand voltage	2.5kV
Pollution degree	2
Operating temperature range	-10°C to +55°C (with no icing or condensation)
Operating humidity range	35% to 85%
LED indication	Output Relay Supplies
Weight	280 g
Performance (max.)	PL e/Cat. 4 (EN ISO 13849-1:2008)
Functional test: The relays must	SIL 3 (EN 62061:2005)
be cycled at least once a year	PFH_D 1.55E-08
Conformity	2006/42/EC, 2006/95/EC, 2004/108/EC EN 62061:2005 EN ISO 13849-1:2008

Expansion relay
JSR2A

Approvals:

Safety relay for:

- More safe outputs
- Greater current switching capacity
- Information output

Features:

- Switching capacity of up to 10 A/250V per output
- Width 45 mm
- LED function indication
- 4 NO/1 NC relay outputs
- 5 supply versions
- Supply 24 VDC/VAC, 115 and 230 VAC
- Quick release connector blocks

More outputs
The JSR2A expansion relay is used to provide increased switching capacity and number of safety outputs to a safety relay. This means that an unlimited number of dangerous machine operations and functions can be stopped from one safety relay.

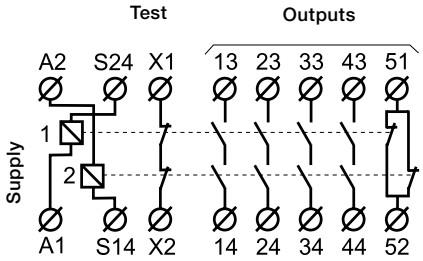
Greater current switching capacity
The JSR2A Expansion relay enables switching of up to 10 amps per output contact.

Safety level
The JSR2A has twin stop functions, that is, two relays with mechanically positively guided contacts. A monitored stop function is achieved by connecting the test output (terminals X1 and X2) to the test or reset input on the safety relay which is to be expanded.

Regulations and standards
The JSR2A is designed and approved in accordance with appropriate directives and standards. See technical data.

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

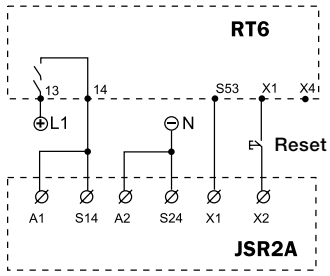
Technical description – JSR2A



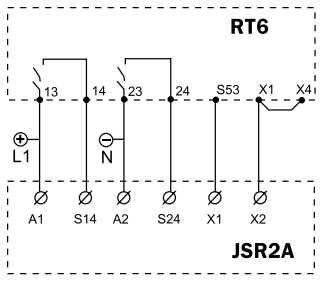
The JSR2A has to be connected to a suitable safety relay in order to fulfill the necessary safety requirements (see chapter “Connection examples”). The Safety Relay controls and monitors the JSR2A unit. (The JSR2A can be connected for single or dual channel operation - see Electrical connection diagrams below). When the inputs to S14 and S24 close, internal relays K1 and K2 are activated. A stop signal is given, K1 and K2 drop, if the inputs are opened or during power failure.

To check that both the K1 and K2 relays drop during a stop signal they must be monitored. This is achieved by connecting X1 and X2 to the test or reset input on the safety relay which is expanded. K1 and K2 have mechanically positively guided contacts, therefore, if one of the output contacts should stick closed then the relay’s contact in X1-X2 cannot be closed thus preventing a new ready signal being given to the safety relay.

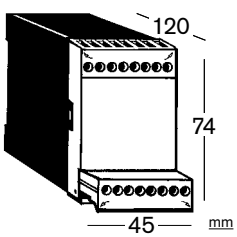
Electrical connection – JSR2A



One channel expansion of RT6 with JSR2A connected for manual reset.



Dual channel expansion of RT6 with JSR2A connected for automatic reset.



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

Technical data – JSR2A

Article number	
JSR2A 10 A 24 VAC/VDC	2TLA010027R0100
JSR2A 10 A 115 VAC	2TLA010027R0400
JSR2A 10 A 230 VAC	2TLA010027R0500
Colour	Grey
Supply A1 - A2	24 VDC/AC, 115, 230 VAC + 15%, 50-60 Hz
Power consumption	2.7W/2.4–4 VA
Relay outputs	4 NO + 1 NC
Max. switching capacity	
Resistive load AC	8A/230 VAC/1840 VA 10A/115VAC/48VAC/24VAC/ 1840 VA
Inductive load AC	AC15 230 VAC 4A (NO-contact) 1.5A (NC-contact)
Resistive load DC	8A/24 VDC/192 W
Inductive load DC	DC13 24 VDC 1.2A (NO/NC-contact)
Max. total switching capacity:	16A distributed on all contacts
Min. load	10mA/10V/100mW (if load on contact has not exceeded 100 mA)
Contact material	AgSnO2 + Au flash
Fuses output (External)	6A gL (8A fast if short-circuit current >500A)
Conditional short-circuit current (1 kA)	10A gG
Max. Input wire res. at nom. voltage	24 VDC/VAC: 100 Ohm 48/115/230 VAC: 200 Ohm
Mechanical operational Life	>10^7 operations
Response time at	
deactivation (input- output)	<25 ms
activation (input - output):	<15 ms
Terminals (removable)	
Max. screw torque	1 Nm
Connection area (max.)	
Single strand	1x4 mm² or 2x1.5 mm² / 12AWG
Conductor with socket contact	1x2.5 mm² or 2x1 mm²
Mounting	35 mm DIN-rail
Protection class terminals	
Enclosure	IP40 IEC 60529
Terminals	IP20 IEC 60529
LED indication	
On	Supply voltage
1 2	Output relays 1 and 2
Impulse withstand voltage	2.5kV
Pollution degree	2
Operating temperature range	-10°C to +55°C (with no icing or condensation)
Operating humidity range	35% to 85%
Weight	313 g
Performance (max.)	PL e/Cat. 4
Functional test: The relays must be cycled at least once a year	(EN ISO 13849-1:2008) SIL 3 (EN 62061:2005) PFH_D 1.55E-08
Conformity	2006/42/EC, 2006/95/EC, 2004/108/EC EN 62061:2005 EN ISO 13849-1:2008

Expansion relay
JSR3T

Approvals:

Safety relay for:

- Safe delay of stop signals with selectable value
- Delayed safe outputs

Features:

- Width 22.5 mm
- Supply 24V AC/DC
- Output indication
- 2 x 1 NO relay outputs
- Hardwire Selectable Delay 0.5 - 10.0 sec by hardwire links and Time trim potentiometer

Delayed outputs

By connecting the JSR3T expansion relay to a compatible Safety relay it is easy to obtain safe "delayed" outputs.

The JSR3T provides the system designer with the facility to hardwire selected time delays in steps between 0.5 and 10 seconds.

Use of delayed outputs

There are many applications where delayed outputs are necessary and permissible. For example delayed stop signals can be used for emergency stops according to EN ISO 13850:2008 § 4.1.4 Stop Category 1 (a controlled stop with power to the machine actuator(s) available to achieve the stop and then removal of power when stop is achieved). Stop Category 1 may also be permitted when it is not possible to gain physical access to the machine before the safe stop is effected e.g. by:

- Covers and Gates which are locked until dangerous operations and functions have been stopped.
- Long distances between a safety device and dangerous machine functions.
- Using this technique of stopping a machine provides many advantages i.e.:
- Machines last longer as they are not subjected to excessive loading etc when requested to stop.
- Parts being processed are not damaged.
- Restarting machines from stopped position is simplified.

A safe "Soft" stop is achieved by means of a safety relay giving a programme stop to the machine control system. e.g. when a gate is opened or emergency stop is activated. The output of the Safety relay is used to provide both a stop signal to the machine control system i.e. via a PLC which applies the necessary braking/stopping of the machine in a controlled way, and to switch a delayed expansion relay e.g JSR3T. The delayed safety outputs of the JSR3T expansion relay are then used to control the safe disconnection of the power to the actuators/motors etc. of the machine.

Safety level

The JSR3T has twin stop functions, using two positively guided contact relays.

In order to achieve the level of monitoring required the JSR3T must be used with a suitable Safety Relay e.g. JSBR4, or RT6. The JSR3T test output (terminals X1 and X2) must be connected to the test input of the Safety relay being expanded (see connection examples).

The JSR3T provides delay times that even in the event of an internal fault condition complies with the requirement that the set delay cannot increase in time.

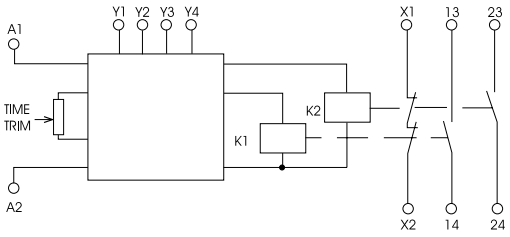
Regulations and standards

The JSR3T 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, EN 954-1/ EN ISO 13849-1.

Connection examples

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

Technical description – JSR3T

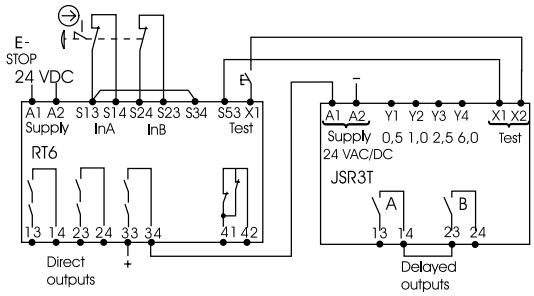


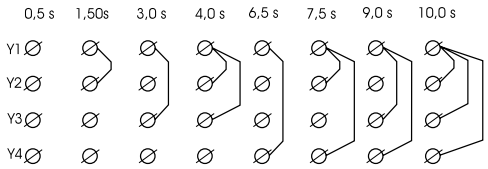
When supply voltage is connected to A1 and A2, relays K1 and K2 are activated. When the supply voltage is removed relays K1 and K2 remain energized for a time period determined by the hardwire link configuration chosen (set by connecting links on the terminals Y1, Y2, Y3 and Y4.) and the setting of the Time Trim potentiometer.

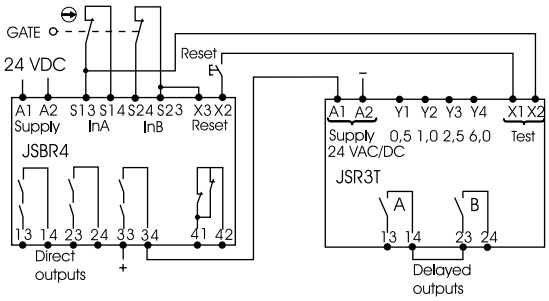
NOTE 1! Max. time set by hardwire links can only be reduced (up to approx. 30% reduction) by Time Trim potentiometer.

NOTE 2! Both the output contacts of K1 and K2 (13 - 14 and 23 - 24) must be used. Output contacts must be either connected in series (forming one safety output) or used in parallel circuits in order to obtain necessary redundancy.

Electrical connection – JSR3T







Technical data – JSR3T

Article number JSR3T 24 VAC/VDC	2TLA010017R0100
Colour	Grey
Power supply	24 VAC/VDC, 50 - 60 Hz
Power consumption	1.3 VA/W
Relay outputs	2 x 1 NO (See Connection examples)
Max. switching capacity Resistive load AC Inductive load AC Resistive load DC Inductive load DC	 4A / 250 VAC/1000 VA AC15 240 VAC 3A 4A / 24 VDC /100 W DC13 24 VDC 2A
Max. res. load total switching capacity:	6A distributed on all contacts
Min. load	10mA/10V (if load on contact has not exceeded 100 mA)
Contact material	AgNi
Fuses output (external)	3A gL/gG or 4A fast
Conditional short-circuit current (1 kA)	6A gG
Max Input wire res. at nom. voltage	100 Ohm
Response time at activation	<20ms
Response time at deactivation	<0.5 - 10.0 sec. at nom. voltage. Selected delay can be lowered by up to approx. 30% by means of preset potentiometer on front panel.
Terminals (max. screw torque 1 Nm)	Single strand: 2x1.5 mm^2 Conductor with socket contact: 2x1mm^2.
Mounting	35 mm DIN-rail
Protection class enclosure/terminals	IP40 / IP20 IEC 60529
Impulse withstand voltage	2.5kV
Pollution degree	2
Operating temperature range	–10°C to +55°C (with no icing or condensation)
Operating humidity range	35% to 85%
LED indication	Outputs
Weight	158 g
Performance (max.) Functional test: The relays must be cycled at least once a year.	PL e/Cat. 4 (EN ISO 13849-1:2008) SIL 3 (EN 62061:2005) PFH_D 3.67E-09
Conformity	2006/42/EC, 2006/95/EC, 2004/108/EC EN 62061:2005 EN ISO 13849-1:2008

Selection of time delay by hardwire links (Y1, Y2, Y3, Y4).

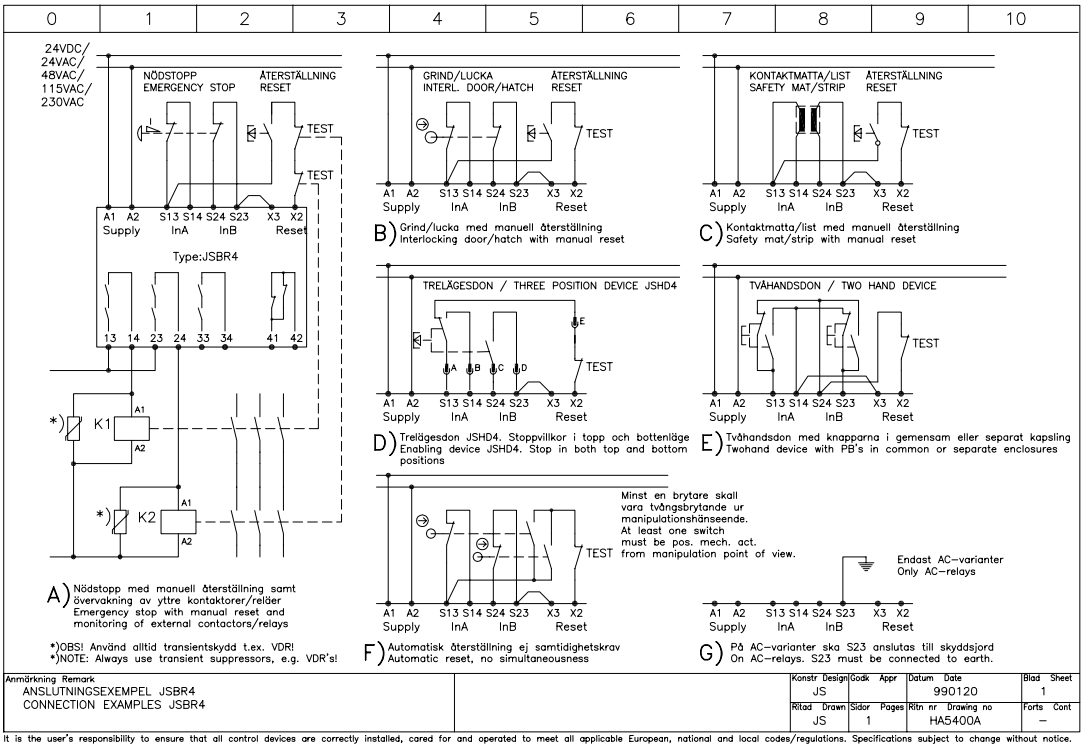
Selected delay can be lowered by up to approx. 30% by means of preset potentiometer on front panel.

It is recommended that all switched loads are adequately suppressed and/or fused in order to provide additional protection for the safety contacts.

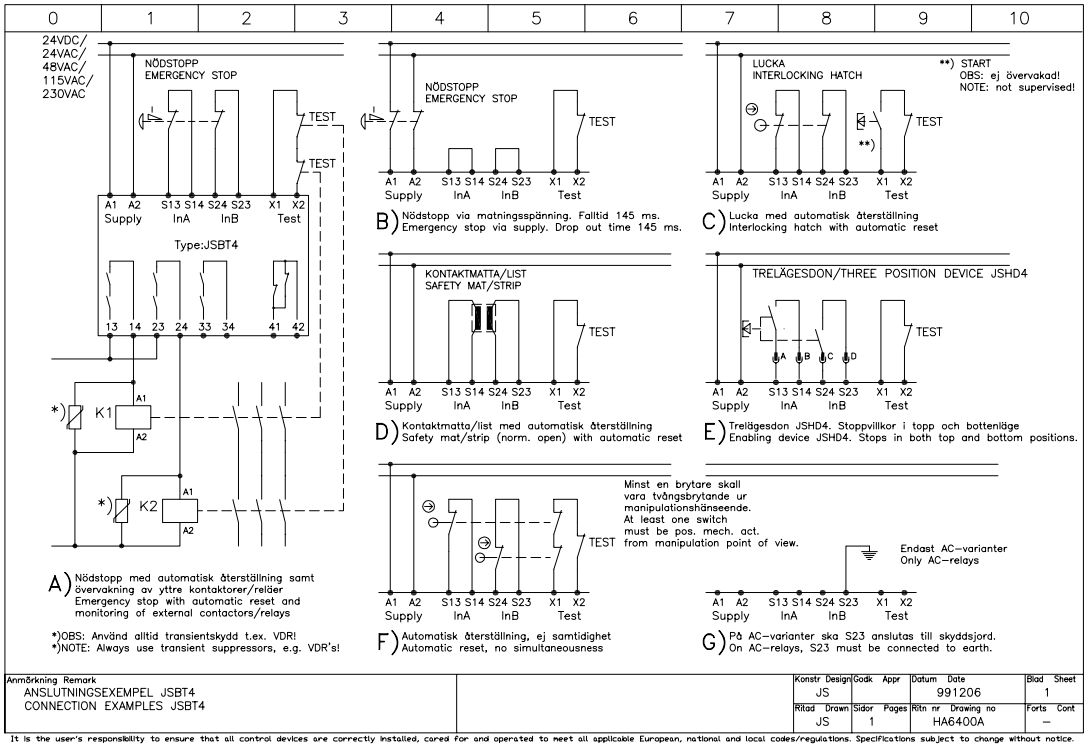
Connection examples

Connection examples

HA5400A Connection examples JSBR4

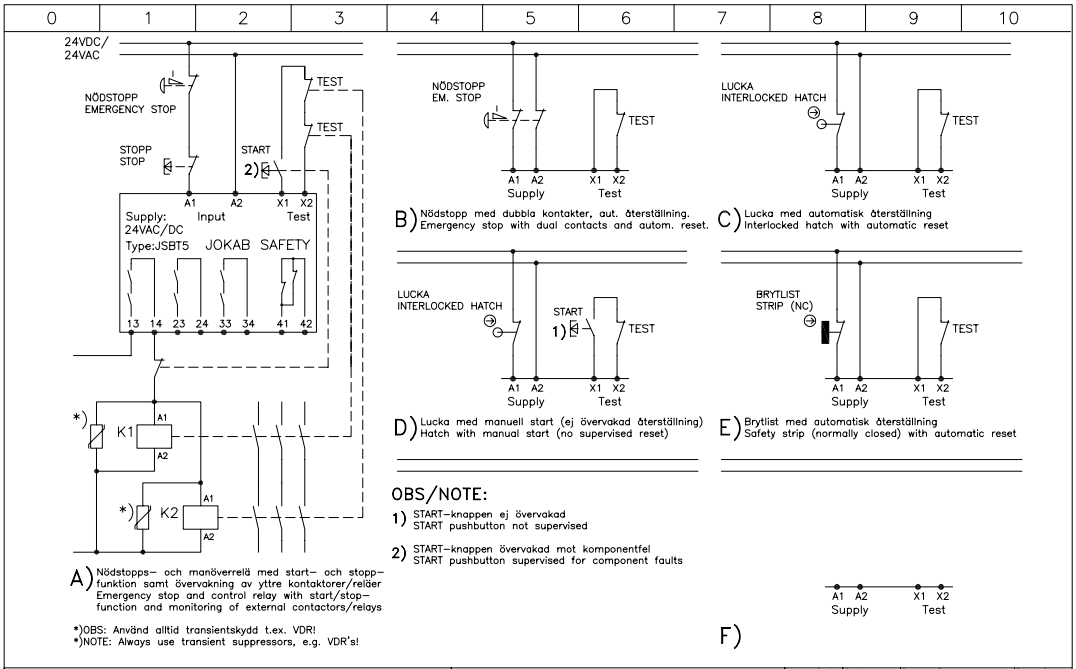


HA6400A Connection examples JSBT4



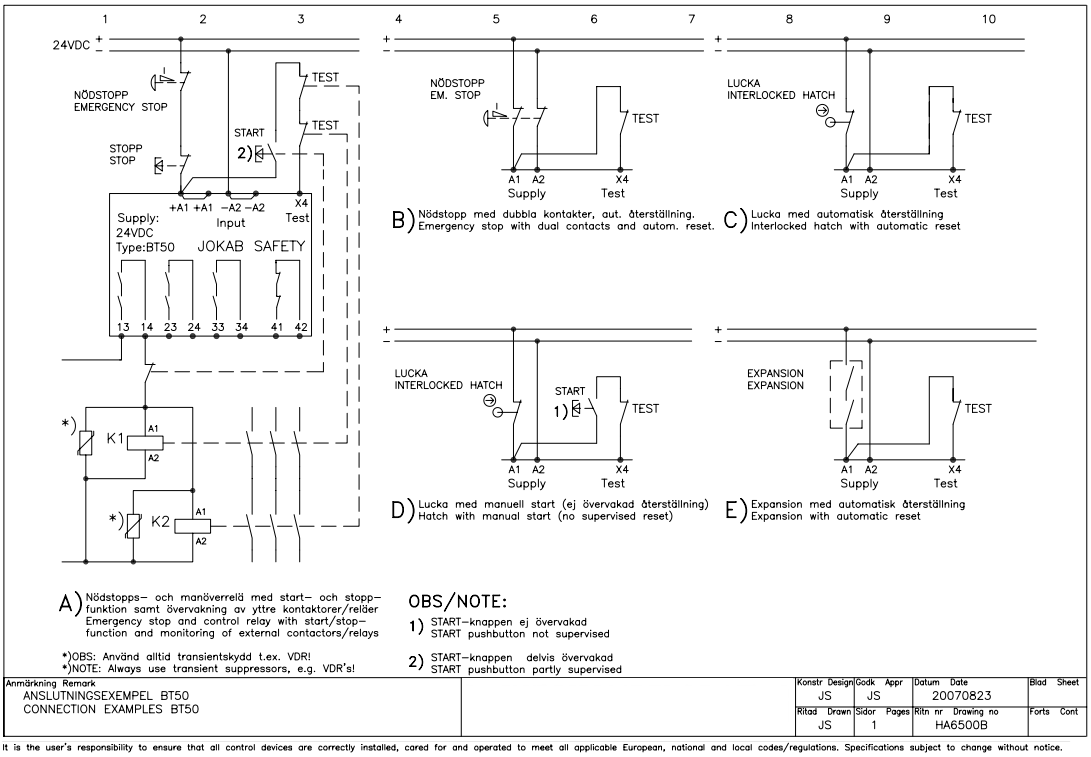
Connection examples

HA6500A Connection examples JSBT5



It is the user's responsibility to ensure that all control devices are correctly installed, cared for and operated to meet all applicable European, national and local codes/regulations. Specifications subject to change without notice.

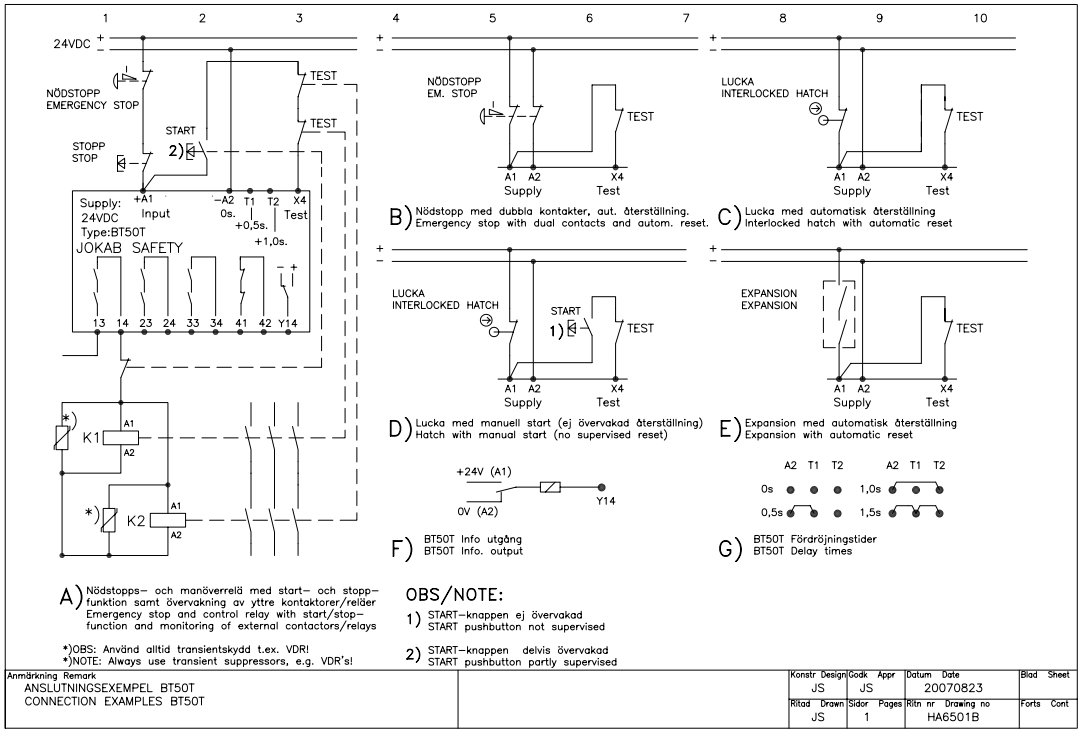
HA6500B Connection examples BT50



It is the user's responsibility to ensure that all control devices are correctly installed, cared for and operated to meet all applicable European, national and local codes/regulations. Specifications subject to change without notice.

Connection examples

HA6501B Connection examples BT50T



A) Nödstopps– och manöverrelä med start– och stopp–funktion samt övervakning av yttre kontaktorer/reläer
Emergency stop and control relay with start/stop–function and monitoring of external contactors/relays

*)OBS: Använd alltid transientskydd t.ex. VDR!
*)NOTE: Always use transient suppressors, e.g. VDR's!

B) Nödstopp med dubbla kontakter, aut. återställning.
Emergency stop with dual contacts and autom. reset.

C) Lucka med automatisk återställning
Interlocked hatch with automatic reset

D) Lucka med manuell start (ej övervakad återställning)
Hatch with manual start (no supervised reset)

E) Expansion med automatisk återställning
Expansion with automatic reset

F) BT50T Info utgång
BT50T Info. output

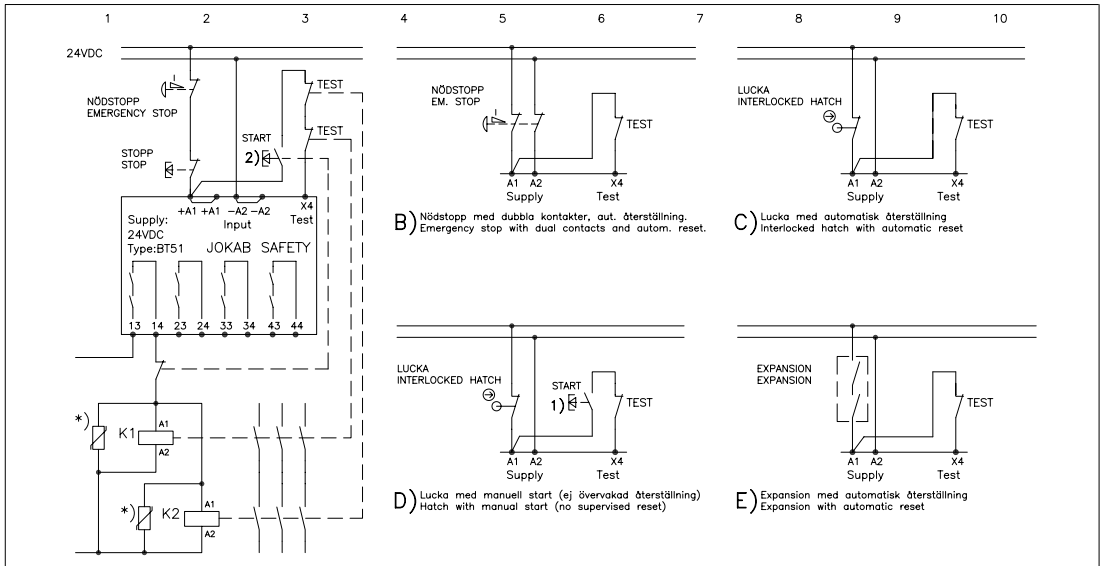
G) BT50T Fördröjningstider
BT50T Delay times

OBS/NOTE:
1) START–knappen ej övervakad
START pushbutton not supervised
2) START–knappen delvis övervakad
START pushbutton partly supervised

Anmärkning Remark	Konstr Design	Godk Appr	Datum Date	Blad Sheet
ANSLUTNINGSEXEMPEL BT50T CONNECTION EXAMPLES BT50T	JS	JS	20070823	
	Ritad Drawn	Sidor Pages	Ritn nr Drawing no	Forts Cont
	JS	1	HA6501B	

It is the user's responsibility to ensure that all control devices are correctly installed, cared for and operated to meet all applicable European, national and local codes/regulations. Specifications subject to change without notice.

HA6500C Connection examples BT51



A) Nödstopps– och manöverrelä med start– och stopp–funktion samt övervakning av yttre kontaktorer/reläer
Emergency stop and control relay with start/stop–function and monitoring of external contactors/relays

*)OBS: Använd alltid transientskydd t.ex. VDR!
*)NOTE: Always use transient suppressors, e.g. VDR's!

B) Nödstopp med dubbla kontakter, aut. återställning.
Emergency stop with dual contacts and autom. reset.

C) Lucka med automatisk återställning
Interlocked hatch with automatic reset

D) Lucka med manuell start (ej övervakad återställning)
Hatch with manual start (no supervised reset)

E) Expansion med automatisk återställning
Expansion with automatic reset

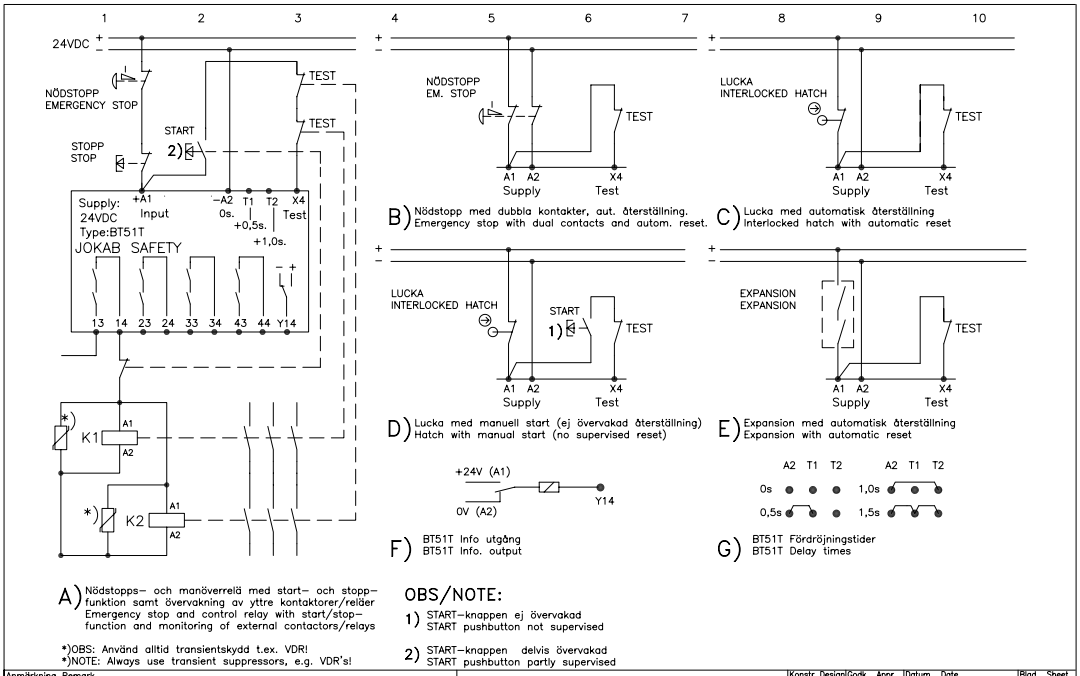
OBS/NOTE:
1) START–knappen ej övervakad
START pushbutton not supervised
2) START–knappen delvis övervakad
START pushbutton partly supervised

Anmärkning Remark	Konstr Design	Godk Appr	Datum Date	Blad Sheet
ANSLUTNINGSEXEMPEL BT51 CONNECTION EXAMPLES BT51	JS	JS	20070828	
	Ritad Drawn	Sidor Pages	Ritn nr Drawing no	Forts Cont
	JS	1	HA6500C	

It is the user's responsibility to ensure that all control devices are correctly installed, cared for and operated to meet all applicable European, national and local codes/regulations. Specifications subject to change without notice.

Connection examples

HA6501C Connection examples BT51T



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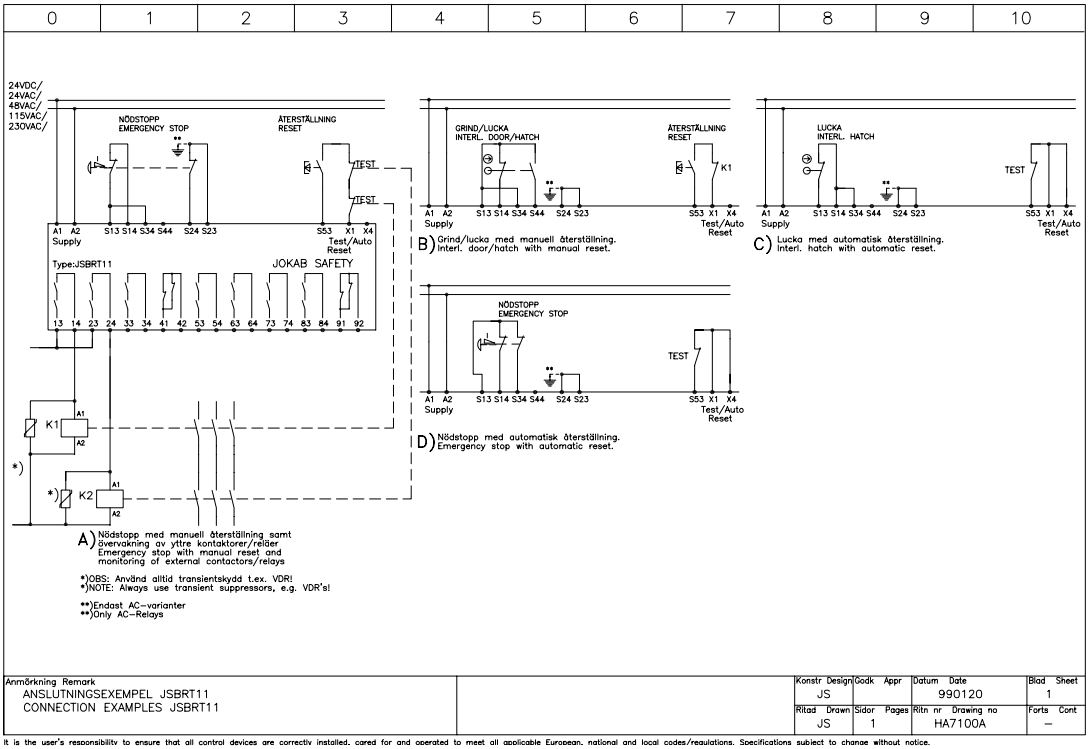
HA7100A Connection examples JSBRT11



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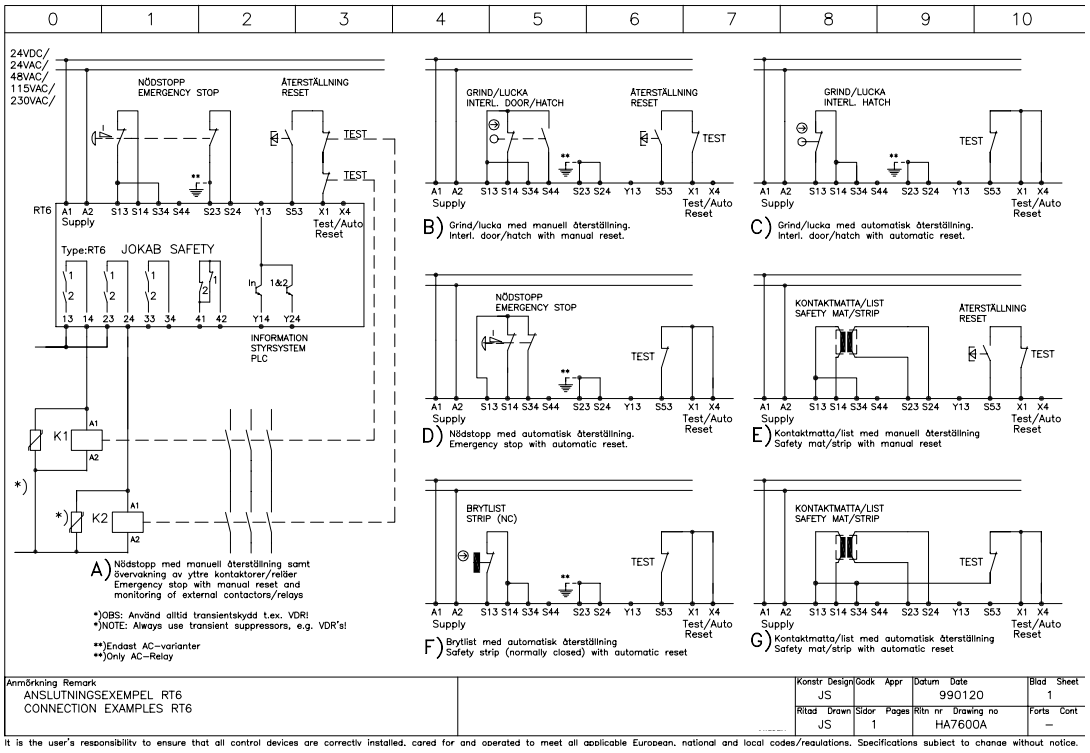
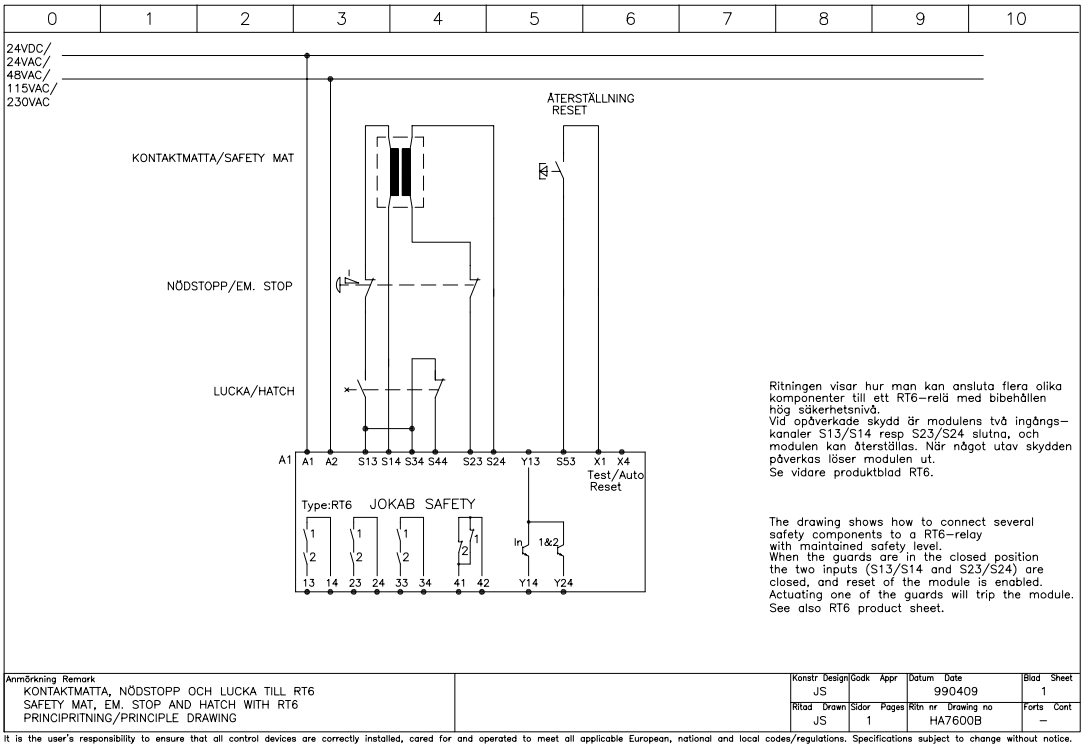
Connection examples

HA7600A Connection examples RT6

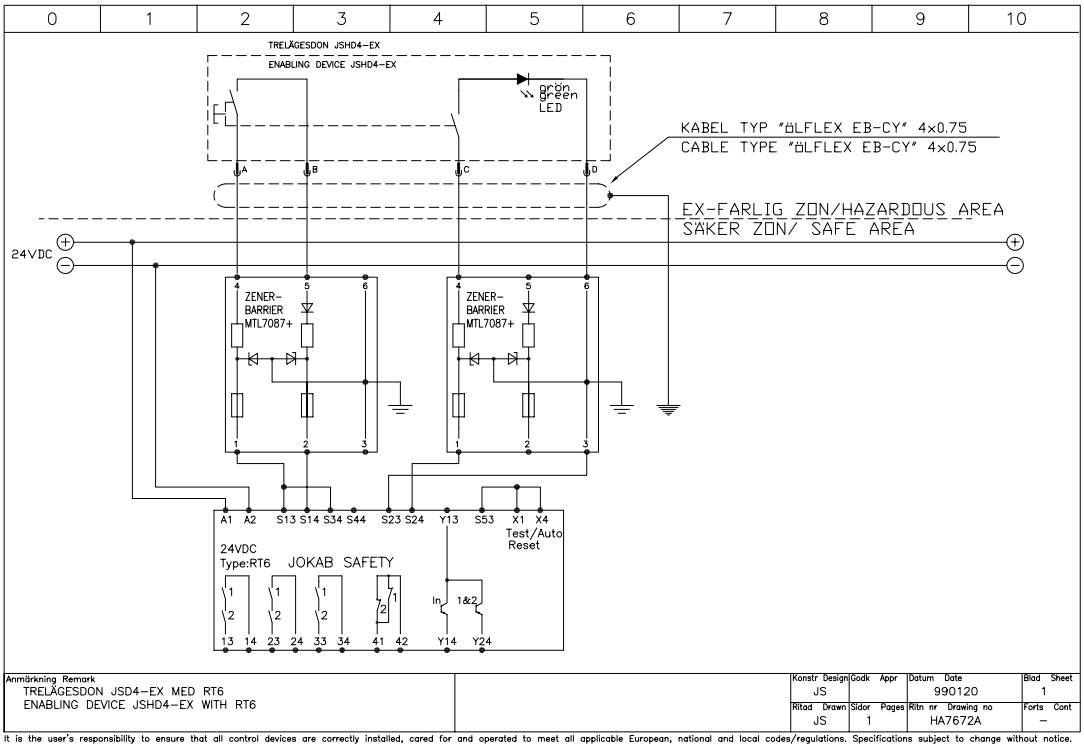


HA7600B Principle drawing RT6



Connection examples

HA7672A Enabling device JSHD4 - EX with RT6



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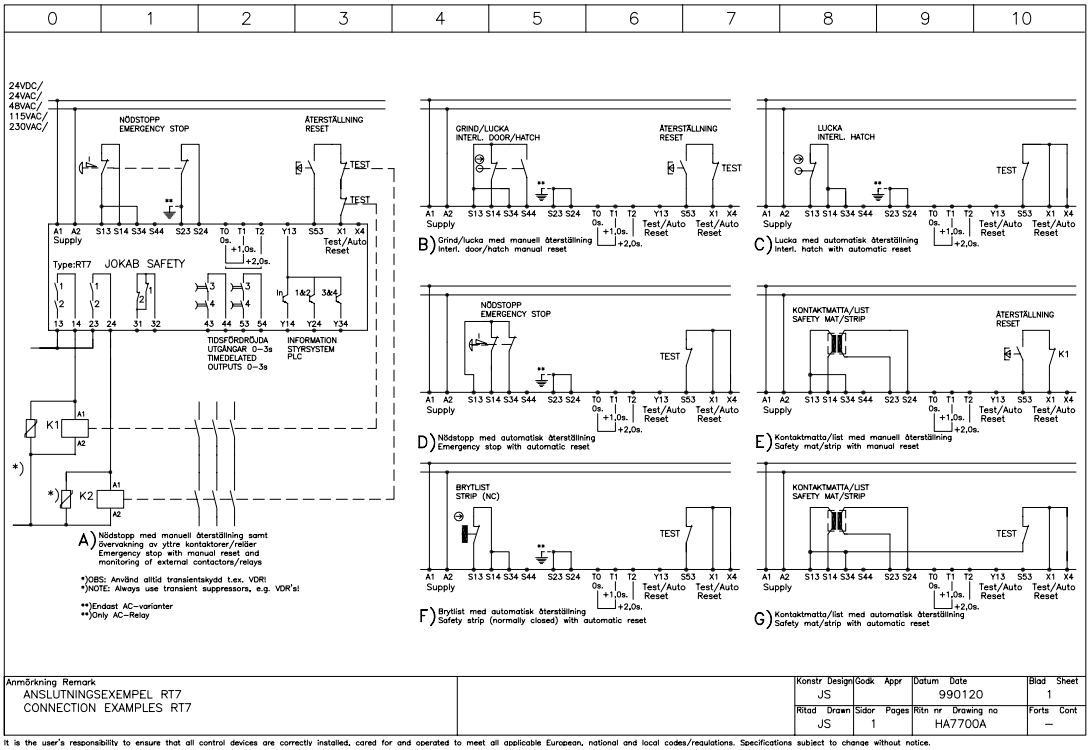
HA7700A Connection examples RT7



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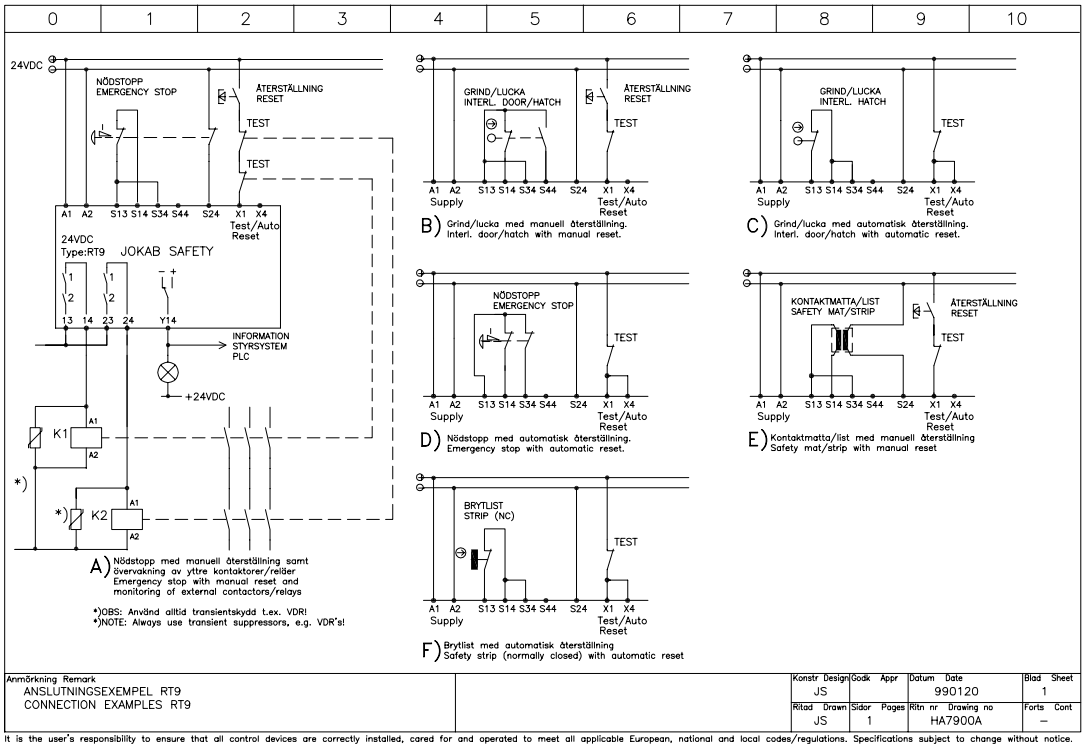
Connection examples

HA7900A Connection examples RT9



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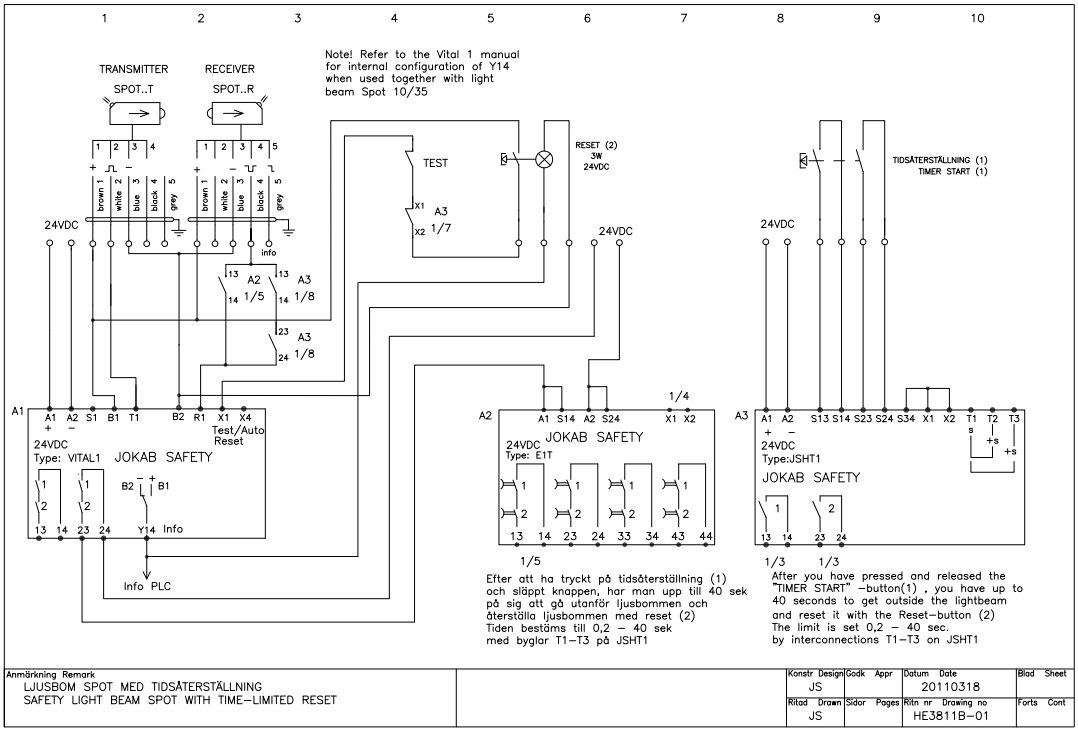
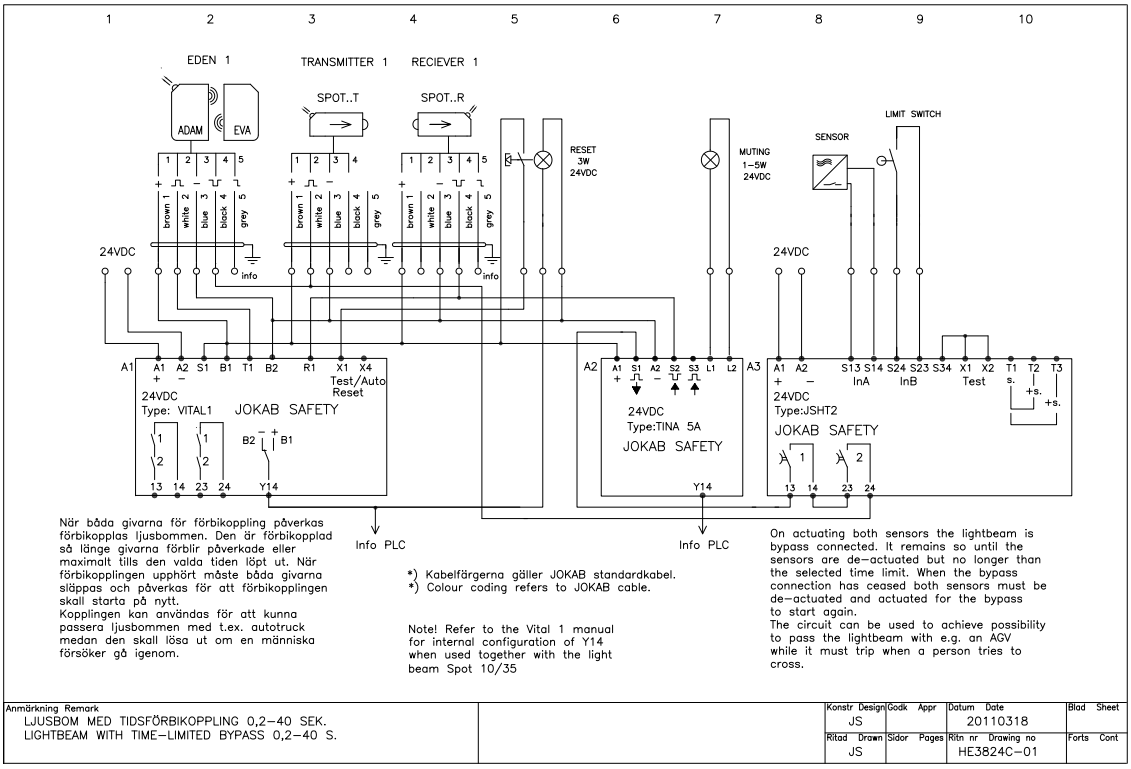
HE3811B Safety Light Beam Spot with time-limited reset

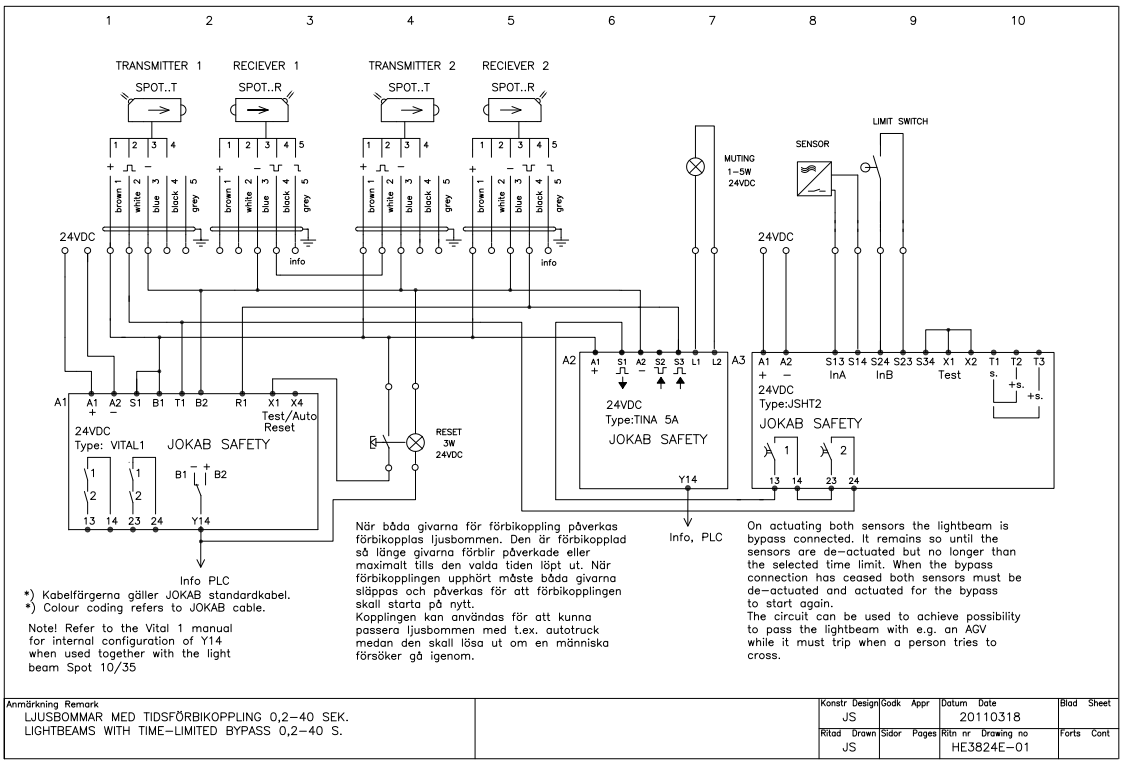


Connection examples

HE3824C-01 Lightbeam with time-limited muting 0.2–40 s

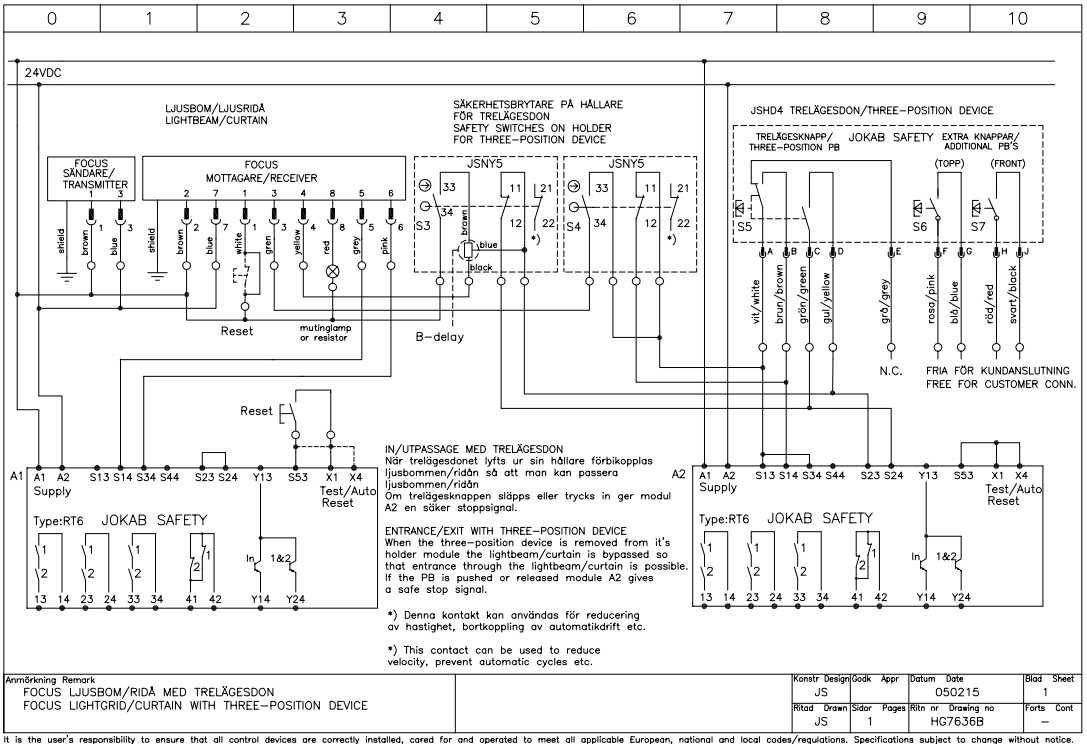


HE3824E-01 Lightbeams with time-limited muting 0.2–40 s

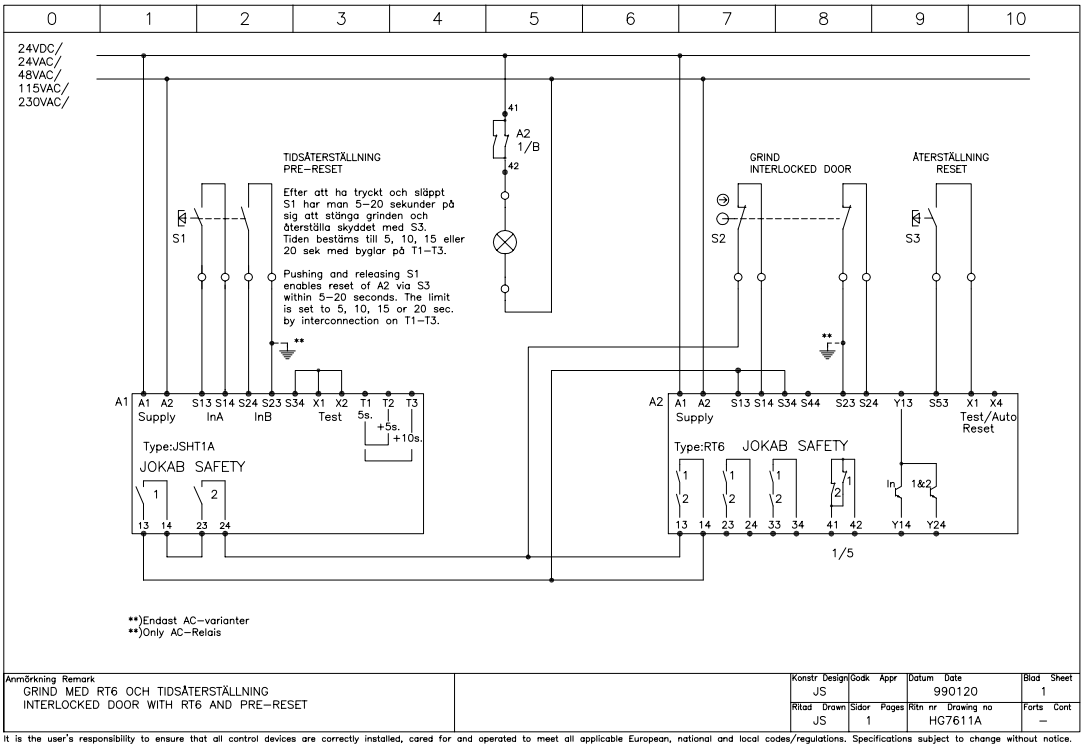


Connection examples

HG7636B Focus light grid/curtain with three-position device

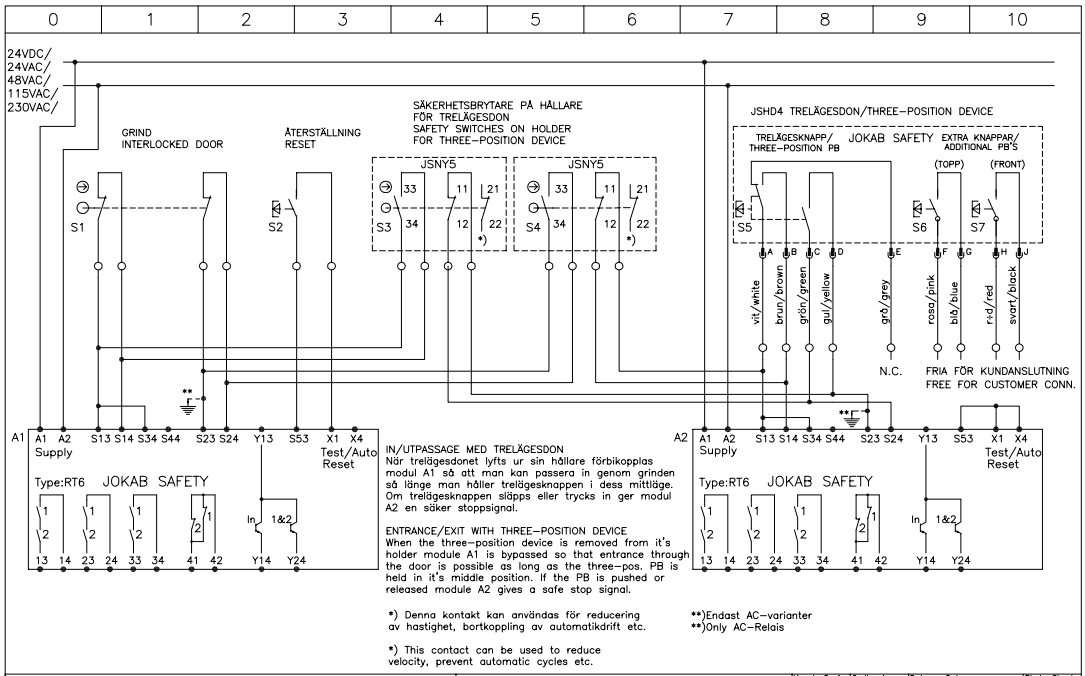


HG7611A Interlocked door with RT6 and pre-reset

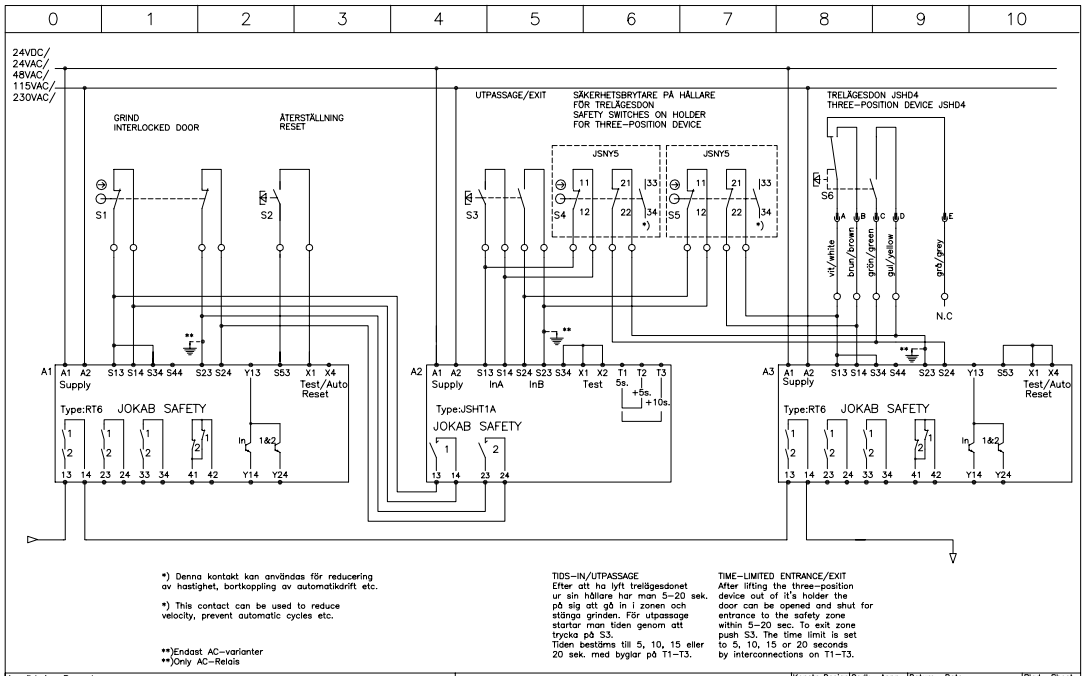


Connection examples

HG7636A Interlocked door with three-position device

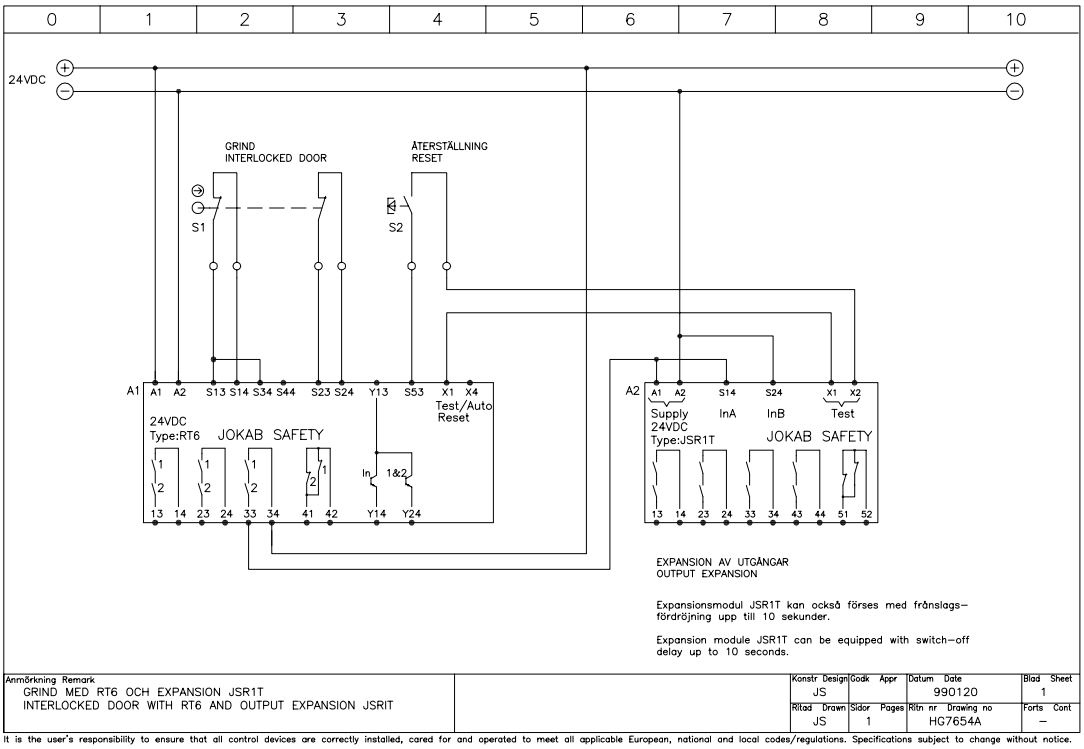


HG7646A Interlocked door with three-position device and time-limited entrance/exit



Connection examples

HG7654A Interlocked door with RT6 and output expansion JSR1T



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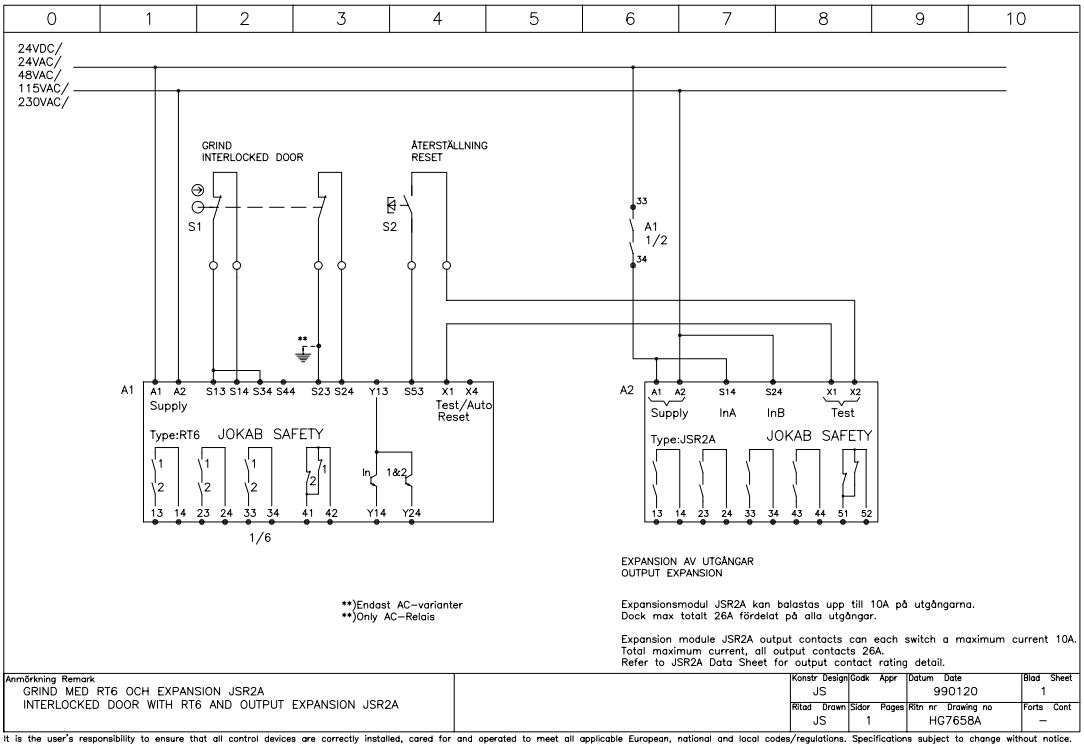
HG7658A Interlocked door with RT6 and output expansion JSR2A



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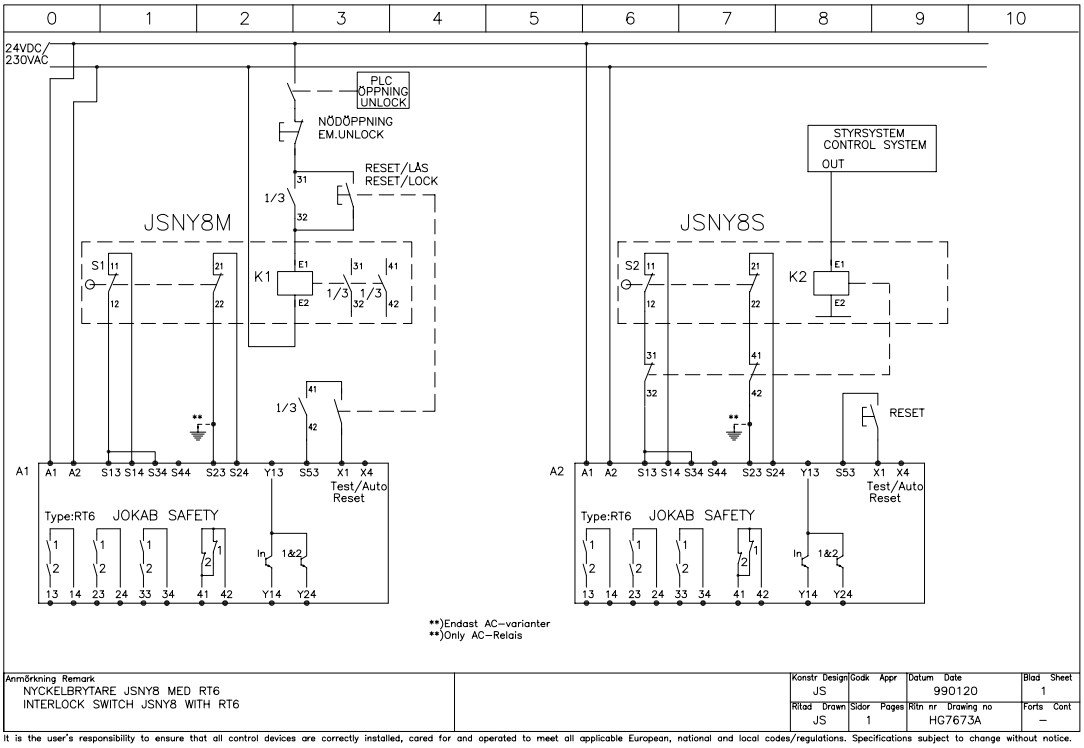
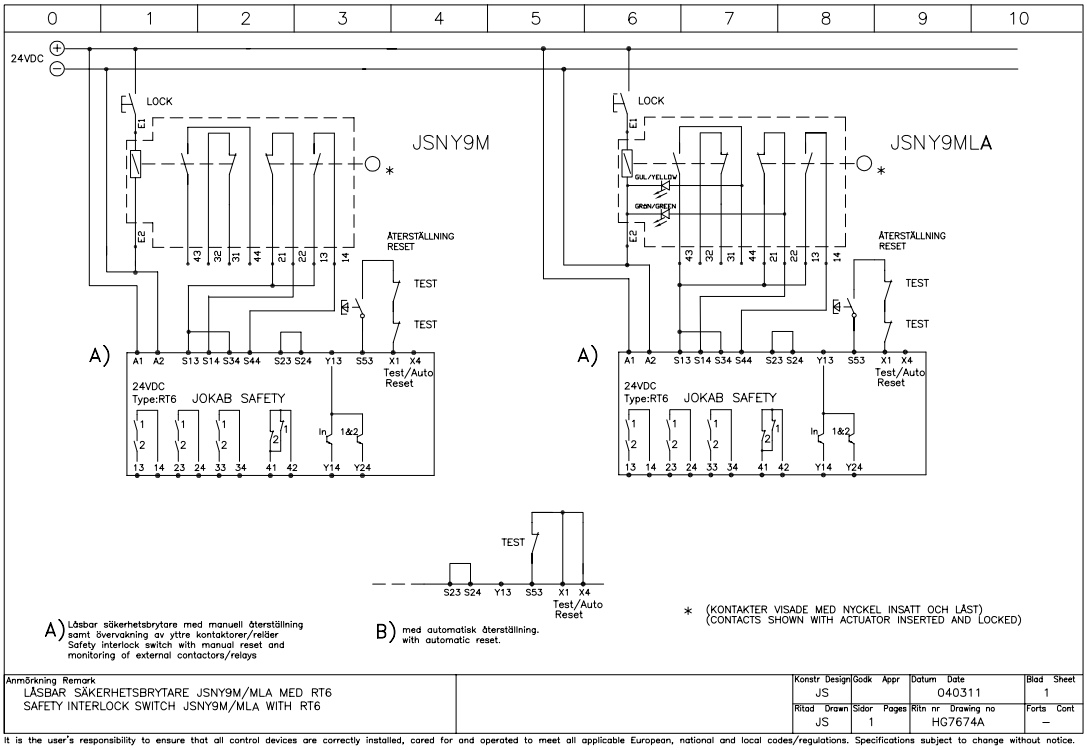
Connection examples

HG7673A Interlock switch JSNY8 with RT6

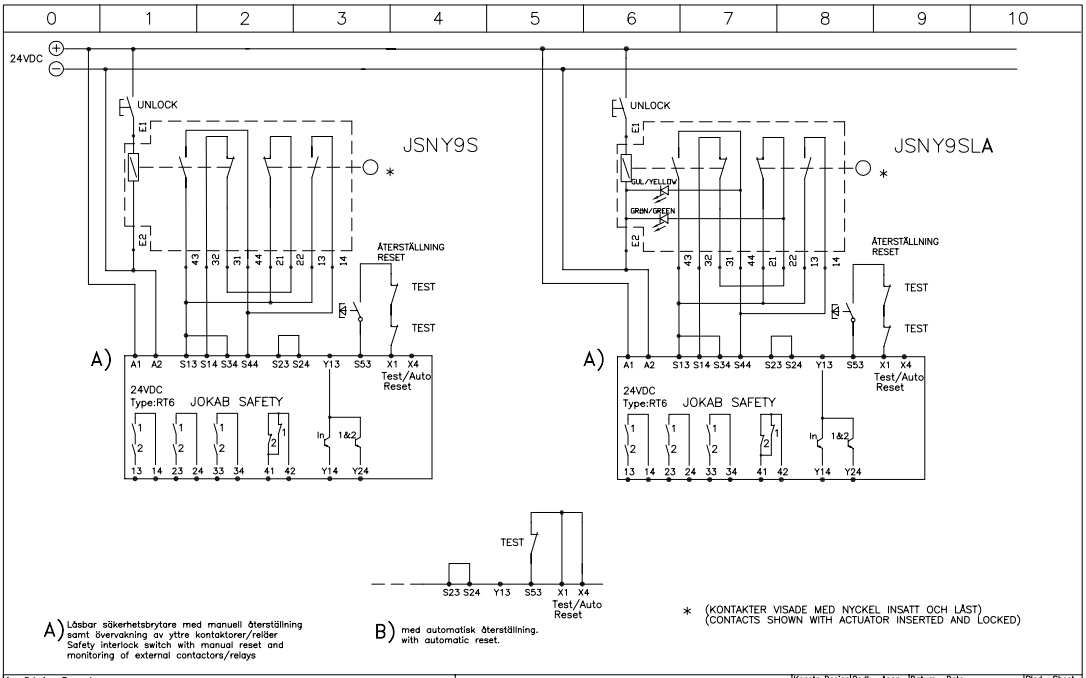


HG7674A Safety interlock switch JSNY9M/MLA with RT6



Connection examples

HG7674B Safety interlock switch JSNY9S/SLA with RT6



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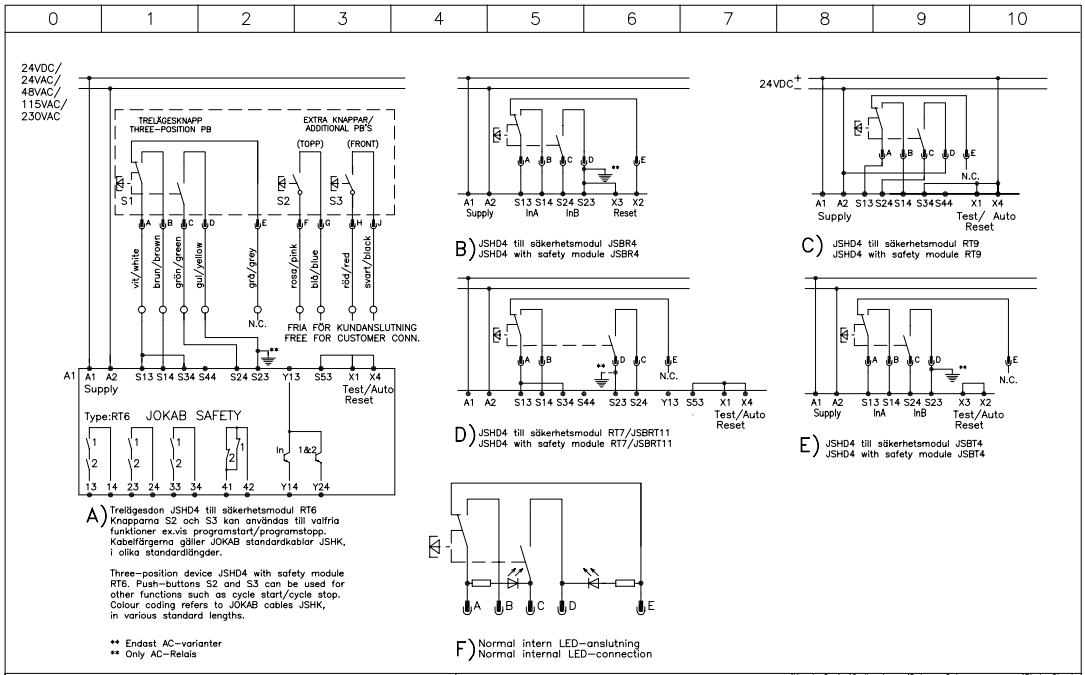
HH0000C Three-position device JSHD4 with various safety controllers



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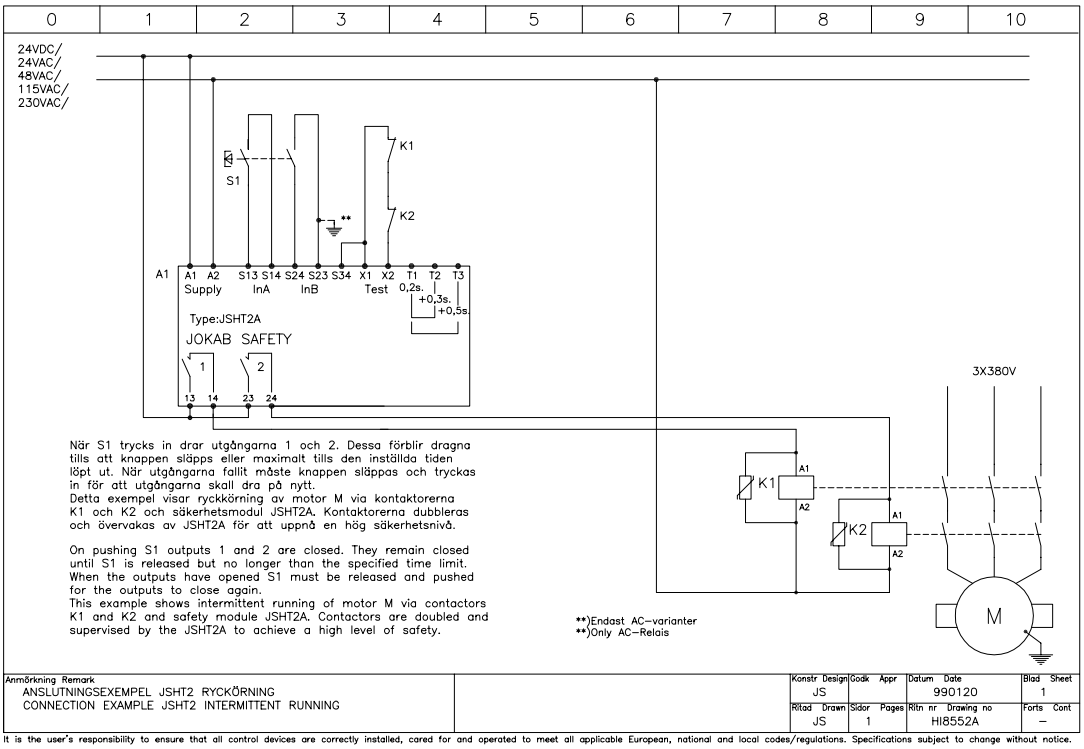
Connection examples

HI8552A Connection examples JSHT2 intermittent running



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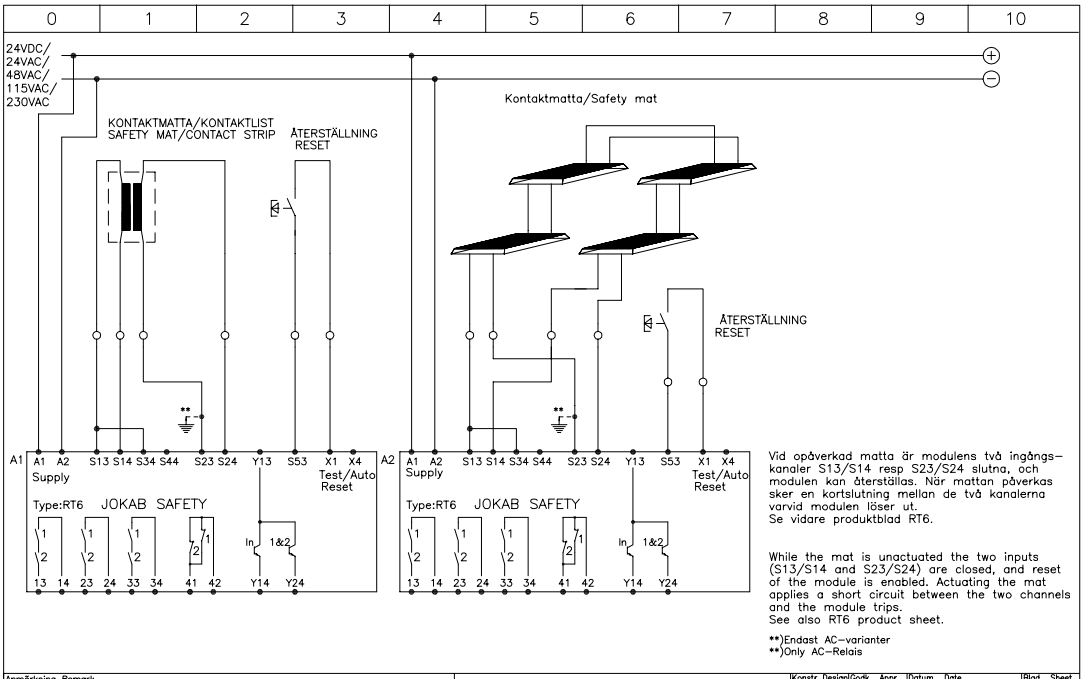
HK7600A Safety mat/Contact strip with RT6



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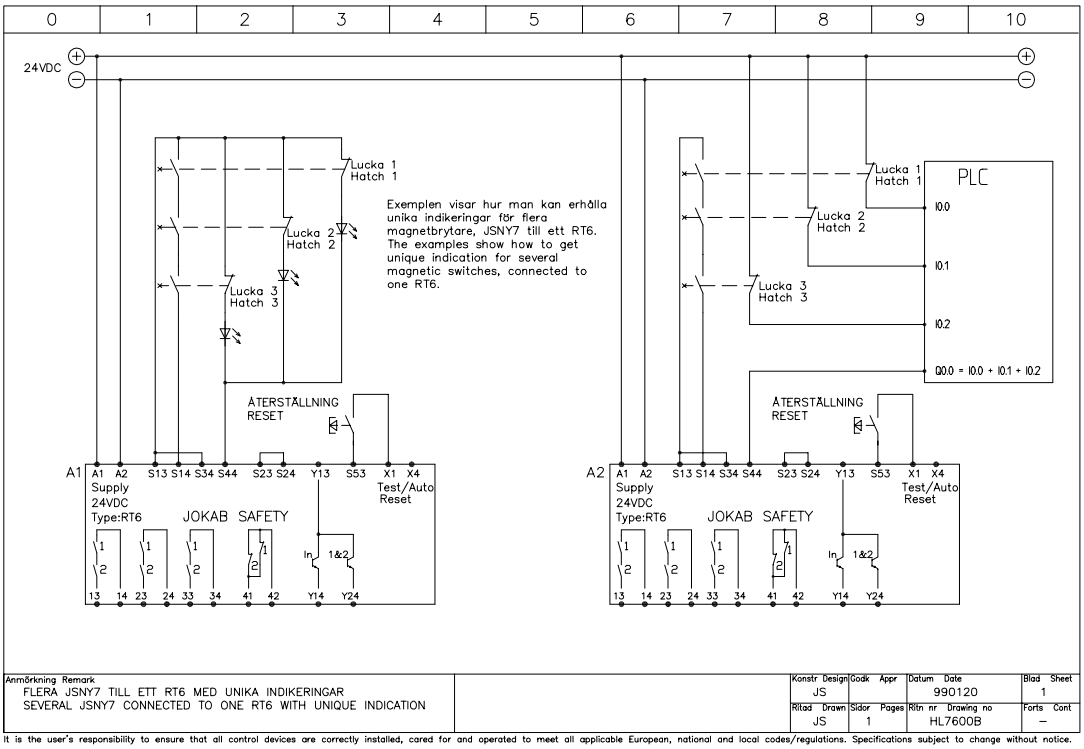
Connection examples

HL7600B Several JSNY7 connected to one RT6 with unique indication



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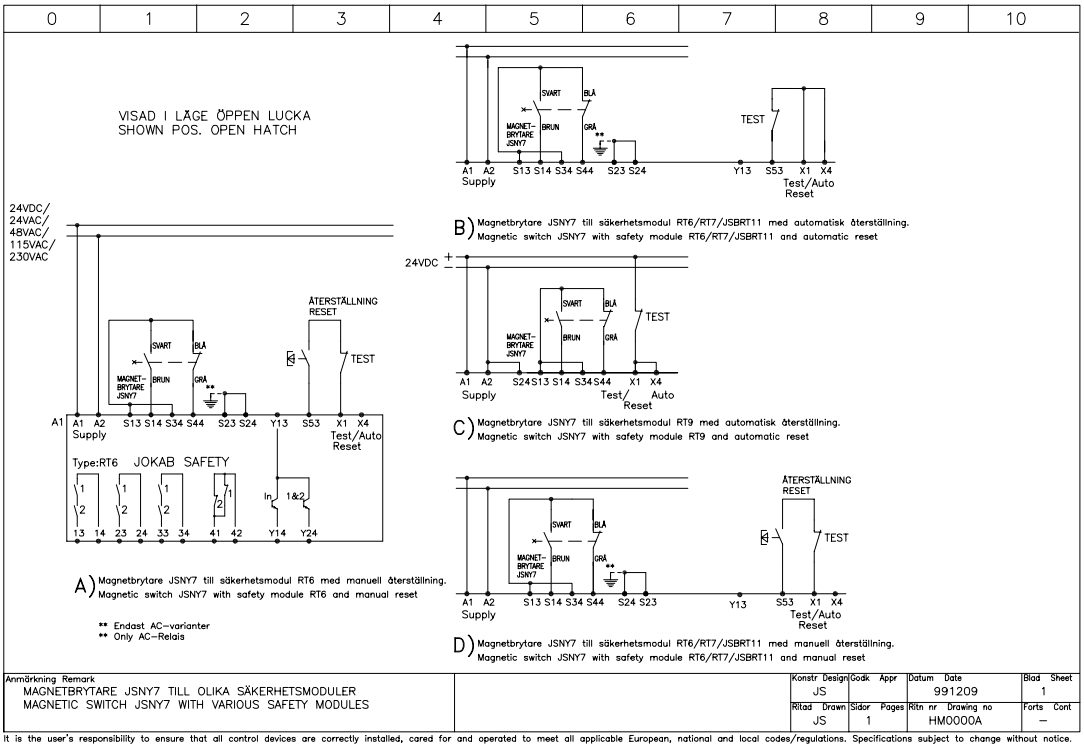
HM0000A Magnetic switch JSNY7 with various safety controllers



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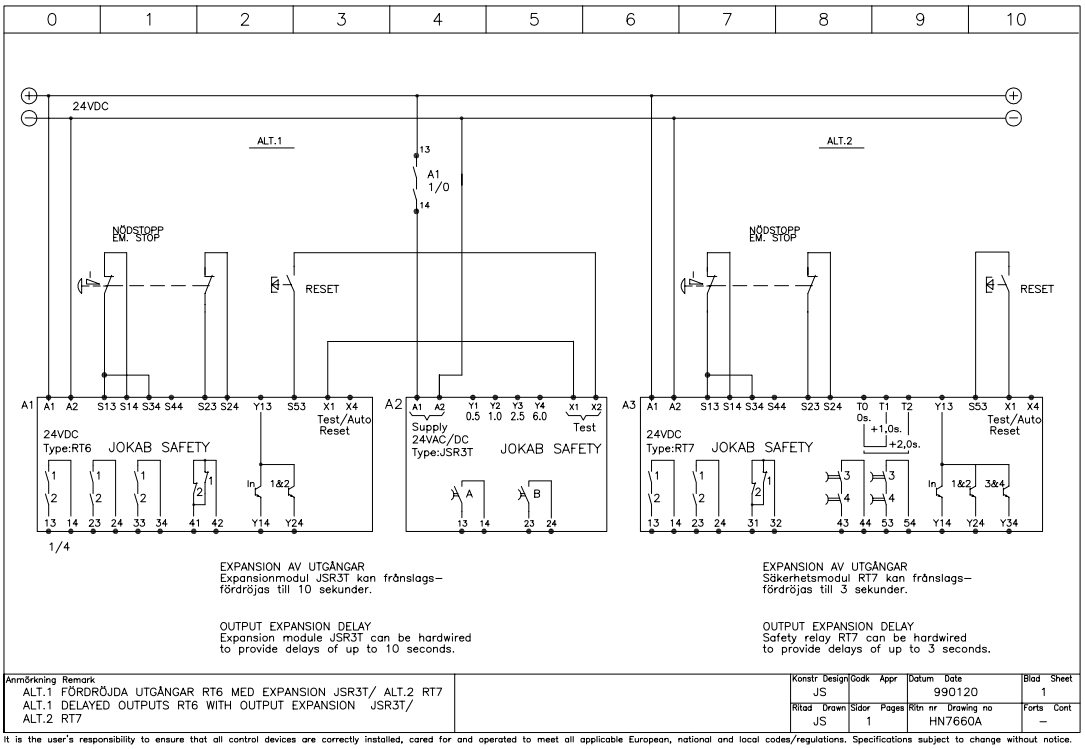
Connection examples

HN7660A Delayed outputs RT6 with output expansion JSR3T and RT7



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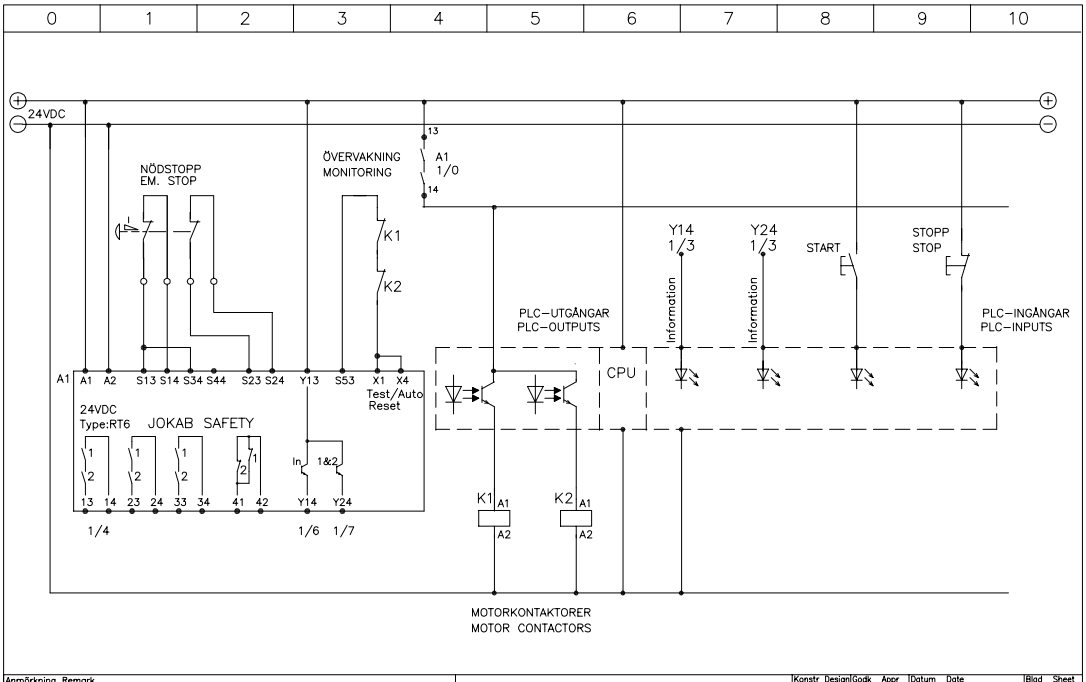
HP7600A Machine control - Isolation of PLC inputs and outputs



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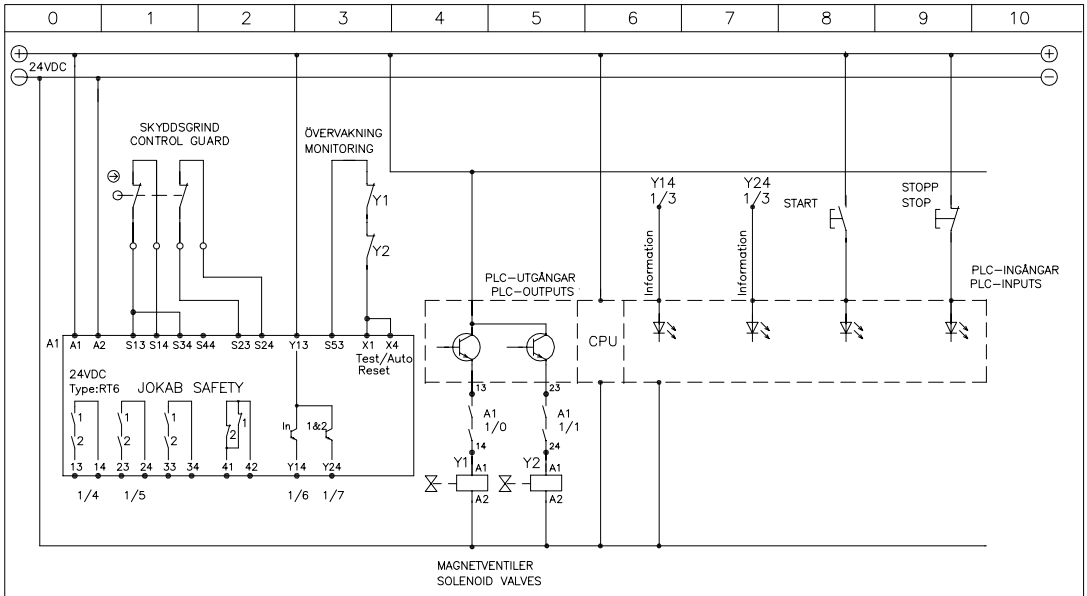
Connection examples

HP7600B Machine control-Isolation of PLC outputs



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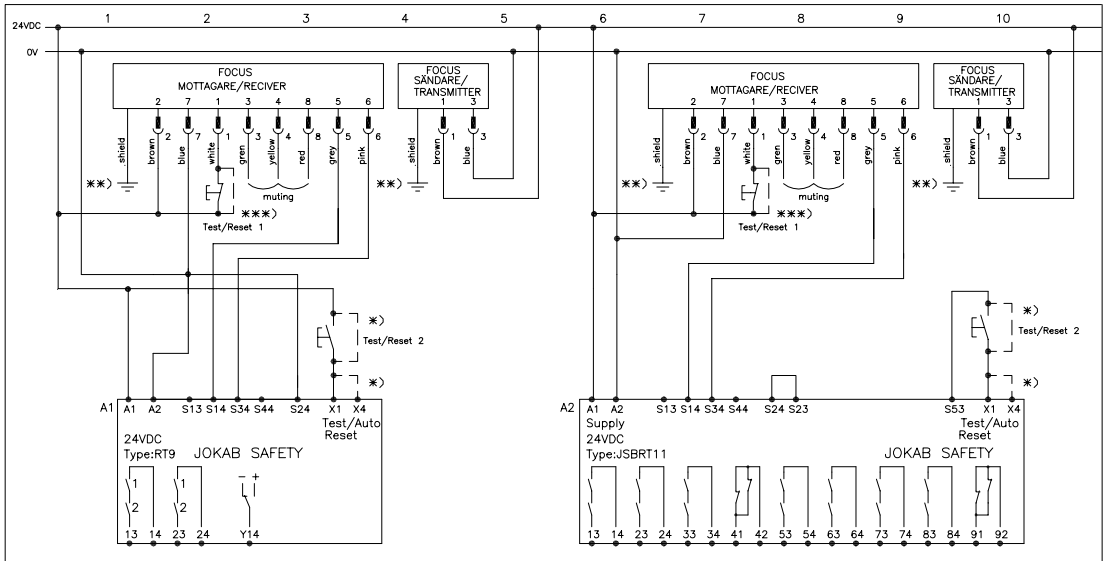
HR7200B Focus light curtain/beam



***)Återställning av ljusridå/ljusbom
För mer imformatiom se Focus manual
***)Reset of the Safety Light Curtain/Barrier
For more information se The Focus Manual

*)Automatisk återställning/Automatic reset (säkerhetsrelä/safetyrelays)
**)Skärmen jordas endast i skåpsänden.
**)The cable shield should only be connected at the cabinet end.

Anmärkning Remark
FOCUS LJUSRIDÅ/LJUSBOM
FUCUS LIGHT CURTAIN/BEAM
Konstr Design JS
Godk Appr
Datum Date 040311
Blad Sheet
Ritad Drawn JS
Sidor Pages 1
Ritn nr Drawing no HR7200B
Forts Cont

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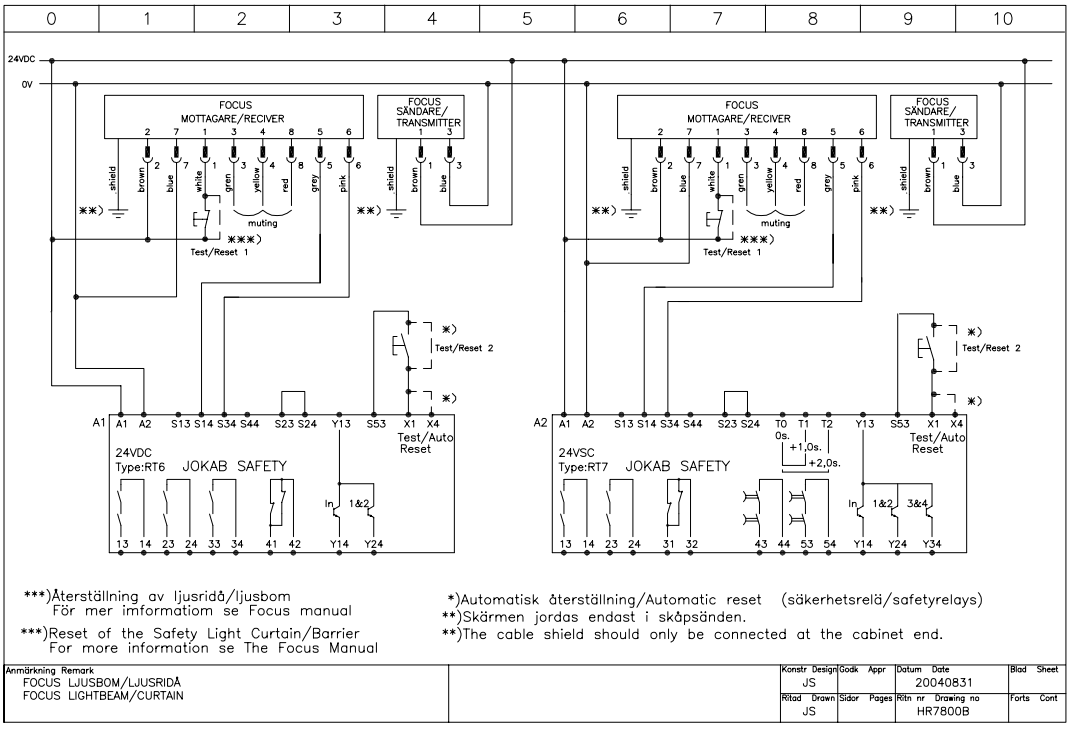
Connection examples

HR7800B Focus lightbeam/curtain



***)Återställning av ljusridå/ljusbom
För mer imformatiom se Focus manual

***)Reset of the Safety Light Curtain/Barrier
For more information se The Focus Manual

*)Automatisk återställning/Automatic reset (säkerhetsrelä/safetyrelays)
**)Skärmen jordas endast i skåpsänden.
**)The cable shield should only be connected at the cabinet end.

Anmärkning Remark	Konstr Design	Godk Appr	Datum Date	Blad Sheet
FOCUS LJUSBOM/LJUSRIDÅ FOCUS LIGHTBEAM/CURTAIN	JS		20040831	
	Ritad Drawn	Sidor Pages	Ritn nr Drawing no	Forts Cont
	JS		HR7800B	

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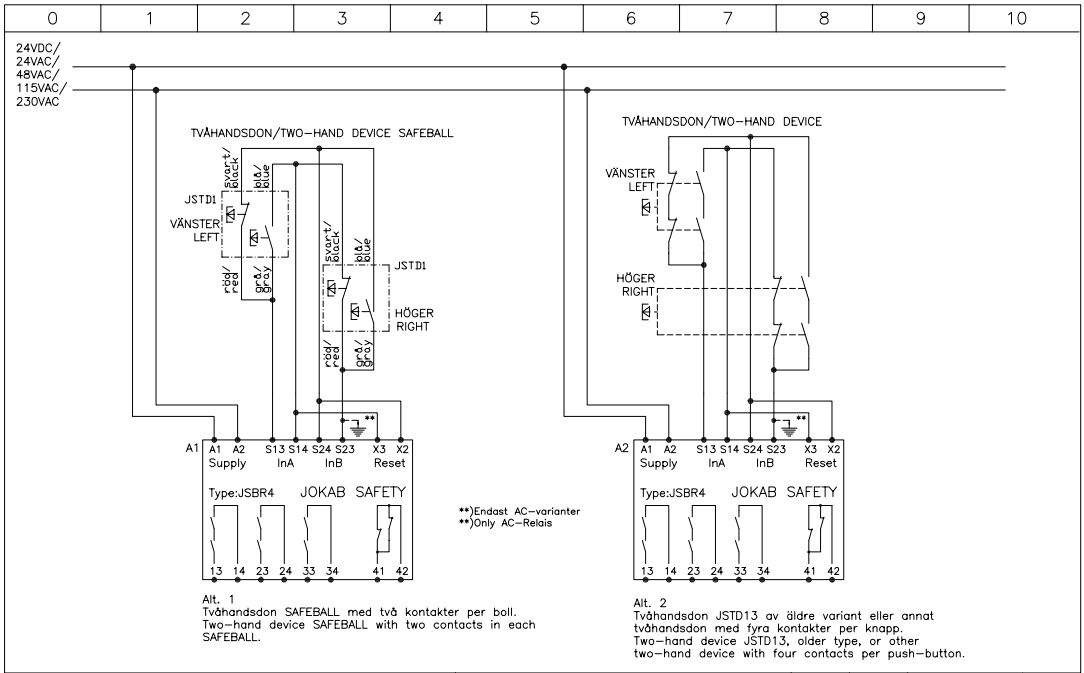
HT5400A Two-hand device with safety relay JSBR4



**)Endast AC-varianter
**)Only AC-Relais

Alt. 1
Tvåhandsdon SAFEBALL med två kontakter per boll.
Two-hand device SAFEBALL with two contacts in each SAFEBALL.

Alt. 2
Tvåhandsdon JSTD13 av äldre variant eller annat tvåhandsdon med fyra kontakter per knapp.
Two-hand device JSTD13, older type, or other two-hand device with four contacts per push-button.

Anmärkning Remark	Konstr Design	Godk Appr	Datum Date	Blad Sheet
TVÅHANDSDON MED SÄKERHETSRELÄ JSBR4 TWO-HAND DEVICE WIT SAFETY RELAY JSBR4	JS		000228	1
	Ritad Drawn	Sidor Pages	Ritn nr Drawing no	Forts Cont
	JS	1	HT5400A	–

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Connection examples

HB0008A Focus light curtain/light beam connected to an RT9 with the aid of a M12-3D