

TCS-A5

ACTUATOR FOR SAFETY CIRCUIT

GENERALITY



As required by CEI 64/8, the condition of maximum safety in the opening of the switches is obtained with the use of buttons with normally closed contacts associated to an opening coil at minimum voltage. This solution is critical because any voltage interruption (even short) creates an out of service with the relative consequences. The TCS-A5 device has the benefits to have the command (button, relay, etc.) with normally closed contacts and at the same time those of the shunt trip opening coil (immune from defect of opening on voltage brake) instead of that a minimum voltage. This device, as the TCS classical, control the efficiency of the safety network or the opening circuit of the switch associated.

FUNCTIONING

The classic application of the device is to command a switch with shunt trip opening coil (BA) using a series connection of safety buttons. When the device is connected as showed in the picture, with Vc present but without Vaux, the relays are de-energized, the BA don't receive energy and the relay RA is in alarm status. When the Vaux is supplied the led ON turn ON, the Alarm Relay (RA) is energized, the device is in condition of normal functioning, the Trip Relay (RT) after 80 ms is energizing, after others 80 ms the Safety Relay (RS) is energizing and the Led Ready turn ON. In this condition the device is ready to receive the command to trip from the normally closed safety button (NC). After 150 ms from the trip request (NC button pressed) the RT relay is de-energized while the BA actuator is energized, opening the associated switch. The trip status is signalled on the device with the TRIP led turned ON and the READY led turned off and with a remote lamp in parallel to the BA coil. This condition can be stored. In this way it's possible to use safety buttons with instantaneous opening (without mechanical retain). The memory can be resetted using the button on the device or using the

MODELS

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| TCS-A5 | circuits 115-230 Vca |
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OPTIONS

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remote button (free of voltages).

Short-circuiting the terminal 8 and 9 the device will be resetted after the trip request. With the TEST button of the device is possible perform a test without to use the safety buttons. The 5 safety button are checked in the perfect condition of functioning (without short-circuit on terminals or on connection). These buttons should contain a resistance of 1000Ω 1/2W or 1W 1% after the connection terminals (see wiring connection). This presence allows at the device to detect when there are short-circuit on the terminals or on connection.

In application with more of 5 buttons, the button that exceed the limit of 5 should not be of the self-control type.

The number of the self-control buttons should be exactly balanced setting the number on the dip-switches on the device.

It's important to set the number correct because an error could create some problem to the device that don't recognize the number and the condition of the connected button.

When on one or more of the self-control buttons there is an abnormal connection, the Push button Alarm Led, on the device, turn on and the Alarm relay is de-energized, the exchange 16-17-18 commute for the remote signalling; This condition is only of alarm and don't cause the system Trip. In addition to the fail safe, on the power supply, the device also contain TCS function (control open circuit). The device can also control the efficiency of the source of control voltage (Vc) and the circuit connection to the BA. For a fault on a BA circuit, it's possible to have the two following situation:

1. With Trip-BA switch set to OFF, the BA Alarm led is turning ON and the RA relay is de-energized with the signalling of remote Alarm. When the fault disappears the BA Alarm led is turning off and the RA relay energized, the remote signalling disappears. The Trip relay (RT) doesn't change his status.
2. With Trip-BA switch set to ON it's possible to have one of the following cases:
 - 2.1. With Auto-Reset (Remote Reset) not inserted the Trip memory will be activated, the Trip Led will turn on, the led READY will turn OFF and the Trip relay (RT) will be de-energized, the same way of the BA trip. This condition is hold up to the RESET that turn off the memory. If in the meantime the fault was removed, everything come back to the normal, otherwise, even if the TCS-A5 is come back in the READY condition, the ALARM BA led remain ON and the RA relay is still in alarm. It's obvious that this is an emergency condition and the power switch should not be closed because it would be not able to open by electricity.

2.2 With Auto-Reset (Remote Reset) inserted (short-circuit between 8 and 9 terminals) the Trip Relay (RT) is de-energized for 50÷100 ms and after it come back energized. This caused the momentary closing of the contacts of the 11 and 12 terminals. With this contacts and with the RA contacts it's possible to create a specific remote signalling of fault of the BA circuit, with priority greater than the alarm signalling for button in short-circuit.

If in the condition of normal functioning the Vaux is missing, the device has a duration of about 1 second. Exceeded this time there are the following conditions:

1. With the Trip switch set to OFF, the Safety Relay (RS) will be de-energized before of the Trip Relay (RT), without the BA tripping.
2. With the Trip switch set to ON, the Trip Relay (RT) will be de-energized before of the Safety Relay (RS) causing the BA tripping.

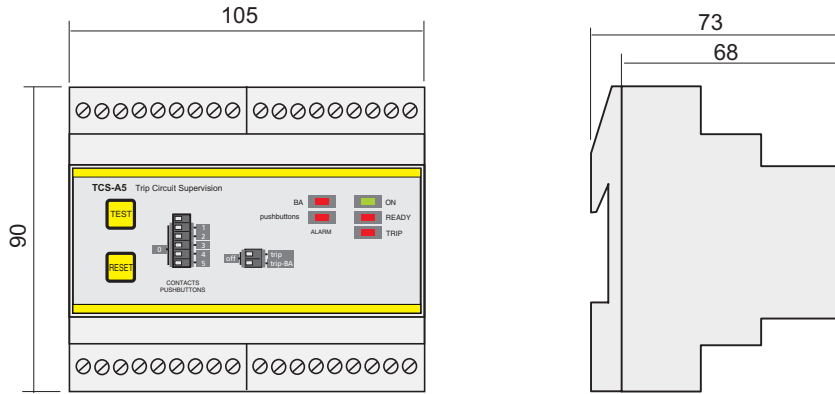
ELECTRICAL CHARACTERISTICS

| models and value | TCS-A5 |
|---------------------------------|---|
| Auxiliary power voltage Vaux | 115÷230Vca 50÷60Hz |
| Max Consumption | 5VA (4W) |
| Line voltage BA | 110÷230Vca/cc |
| Functioning Voltage NC contacts | max 30Vcc |
| Current of NC contacts | Min. 0,4mAcc Max 0,7mAcc |
| BA command output | 1 contact 5A 250Vca free of voltage (fail safe) |
| Alarm output | 1 change 5A 250Vca free of voltage (fail safe) |
| Input NC contacts | n°5 monitored (selectable using dip-switches)+ number unlimited and uncontrolled |
| Signalling on device (led) | ON: presence of power supply. READY: device ready to work. TRIP: Tripping. BA: BA fault. Pushbuttons: NC contact fault |
| Dip-switch | n°5: for monitored contacts n°1 Trip: ON/OFFOFF (for possible trip in case of lack Vaux) n°1 Trip BA: ON/OFF (for any request for trip in case of BA fault circuit) |
| Push-buttons | TEST (test of the device except the NC buttons). RESET (to reset the Trip memory) REMOTE RESET using a free voltage NO contact (short-circuiting the terminals 8 and 9 is performed the auto-reset of the Trip memory) |
| NC command buttons | MAX n°5 monitored (it's important to place the number of dip-switches correct, corresponding to the amount of controlled external buttons). Resistance to be inserted in the button = 10000hm 1W. |
| Box | 6 DIN modules |
| Working temperature | -10°C ÷ +60°C. |
| Storing temperature | -25°C ÷ +85°C |
| Relative Humidity | 90% without condensing |
| Trip from NC | 150ms |
| Ready from Vaux | about 160ms |
| Trip impulse when missing Vaux | about 100ms |
| Trip when missing Vc | (control voltage) or fault on BA |
| Duration without Vaux | about 1 second |
| Norme di riferimento | CEI 64-8/537.4.3 - CEI 64-8 - CEI EN 61010-1 (safety) - CEI EN 61551-1 (safety) - CEI EN 61236-1 (EMC compatibility) - CEI EN 61236-2-4 (EMC compatibility) |

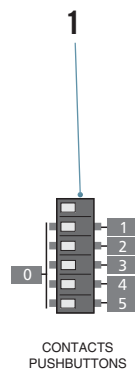
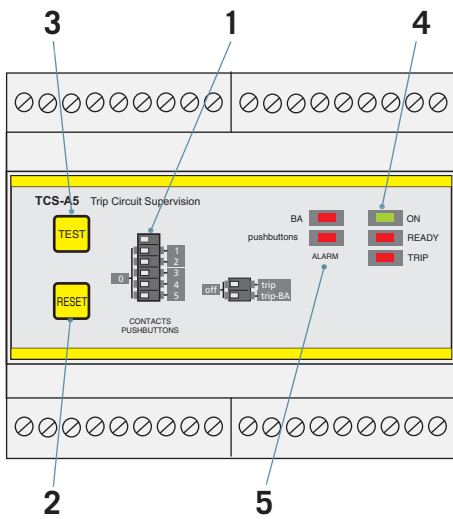
TCS-A5

ACTUATOR FOR SAFETY CIRCUIT

DIMENSIONS



LEGEND



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|---|---|
| 1 | Micro-switches for setting |
| 2 | Test push-button |
| 3 | Reset push-button |
| 4 | GREEN LED for network presence RED LED for relay ready to trip and RED LED trip |
| 5 | RED LED to signalling coil and push button status |

WIRING DIAGRAM

