MONITORING RELAY

Trip circuit supervision relay TCS

Product Guide

Continuous supervision of critical circuits like breaker trip circuit and master trip relay coil independent of the position.

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Introduction

Features

- Continuous supervision of trip circuit independent of the circuit breaker position
- Extremely low burden on auxiliary source
- Complete range of rated AC / DC voltage
- Operation indication for trip circuit healthy and unhealthy
- Low-level measuring current enables application of relay for high burden circuits
- Delayed operation to avoid spurious signals during circuit breaker operation
- Galvanic isolation between auxiliary supply and supervision circuit

Applications

In a protection system the tripping of circuit breaker is crucial. Should an interruption occur in a trip circuit a possible network fault would not be disconnected and the fault would have to be cleared by another up-stream protections in the power system. The supervision function is particularly important when there is only one tripping coil. CB tripping is vital, for instance, for generator circuit breakers or other important circuit breaker in distribution networks.
The supervision relay type TCS is intended for a continuous supervision of circuit breaker trip circuit and gives an alarm for loss of auxiliary supply, faults on the trip-coil or its wires independent of the breaker position, faults on the breaker auxiliary contacts and faults in the supervision relay itself.
The relay supports functions as indicated in Table 2.

Table 1. Application and supported function

Functionality	ANSI	IEC
Trip circuit supervision	95	TCS

Design and principle of operation

The supervision relay TCS is designed to be used for the supervision of trip circuits and other important control and monitoring circuits. Block diagram of the relay is shown in Fig. 1. The supervision function is based on low-level (~ 3 mA) current injection principle.
The injected current is sensed by two opto-couplers. The supervision function in three steady states of circuit breaker-trip circuit can be seen from fig.2, 3 and 4. In normal condition the indicator LED glows green and output relays are in picked-up condition.
If in the event of a fault, the measuring current goes below the operating value of the relay (0.3 - 0.7 mA) or completely stops flowing, the supervision relay operates (drops-off) after a delay of 0.6 sec and the indicator LED turns red.
The supervision relay, for its functioning requires and auxiliary voltage (AC or DC) of rated value to be connected to the terminals *"a"* and *"b"*. This voltage can be the same as that of the supervised circuit or it could be a separate source with same magnitude (ac or dc). Should a fault occur in the auxiliary voltage supply the LED does not glow and the output relay drops off. Relays with differing rated voltage for supervision circuit and auxiliary supply can be supplied as special execution.

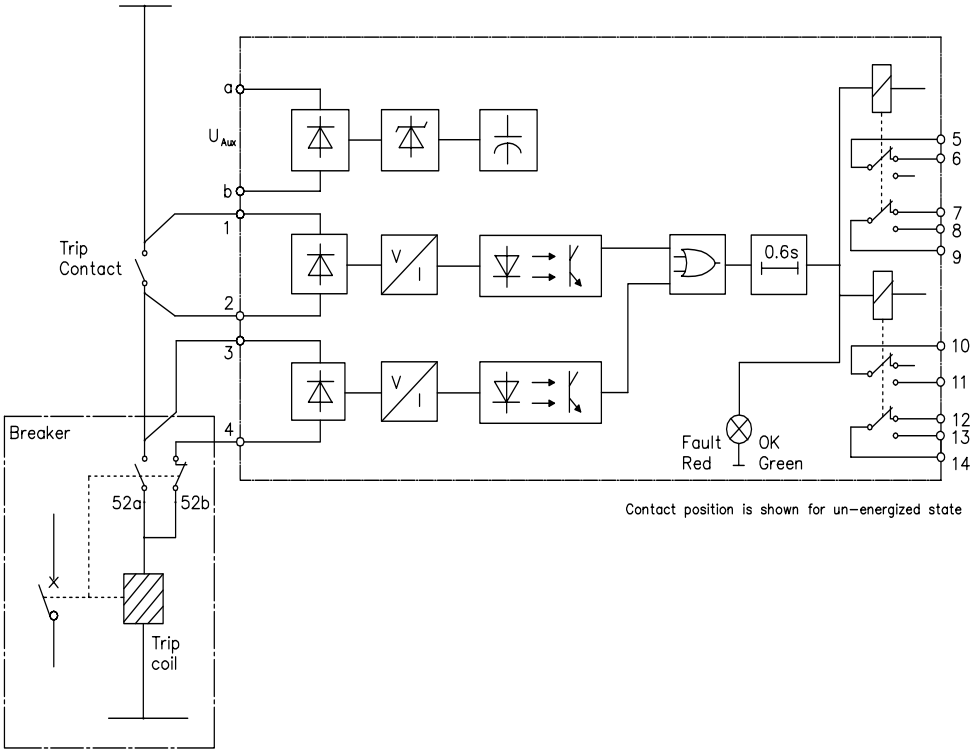


Fig. 1 Block diagram of TCS relay

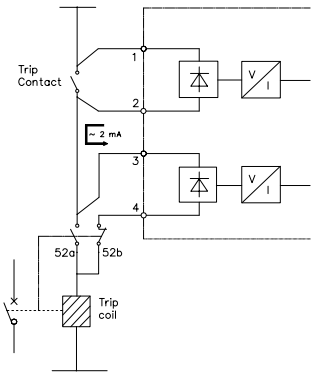


Fig.2 Supervision in Pre-close condition

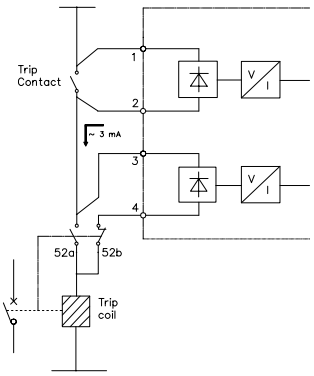


Fig.3 Supervision in Post-close condition

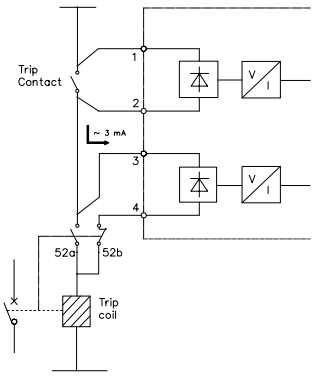


Fig.4 Supervision with latched trip relay

Technical data

Table 2. Dimensions

Relay type Description	Value	
Width	**frame**	108.0 mm
	case	088.0 mm
Height	frame	164.0 mm
	case	112.0 mm
Depth	case	152.0 mm (127 mm + 25 mm)
Weight	relay	1.00 kg

Table 3. Auxiliary Power supply and supervision circuit

Description	Value						
Uaux nominal	24, 30, 48, 110-125, 220-250 V DC 110-125, 220-250 V AC, 50 and 60 Hz						
Uaux variation	80...110% of Uaux						
Pick-up and Drop-off current at rated voltage Uaux and 25° C	0.3 - 0.7 mA						
Operate (Drop-off) time at rated voltage Uaux and 25° C	0.6 - 0.7 sec						
Burden at rated voltage - Auxiliary circuit (W) - Supervision circuit (W)	24 1.0 0.08	30 1.3 0.08	48 1.4 0.15	110 2.0 0.25	125 2.50 0.32	220 2.7 0.54	250 3.5 0.7
Application with AC auxiliary voltage	In case relay is supplied through UPS step-wave or square wave, interposing transformer / surge suppressor is needed to limit aux. supply peak voltage below the upper limit of the relay						

Table 4. Output contact details

Description	Value
Rated voltage	250 V AC/DC
Continuous contact carry	5 A
Make and carry for 0.5 sec	10 A
Make and carry for 3.0 sec	8 A
Breaking capacity when the control-circuit time constant L/R<40 ms, at 48 / 110 / 220 V DC	1.0 A / 0.25 A / 0.15 A
Electrical endurance as per IEC 60255-23	10,000 operations at 110V DC, 0.35A resistive

Table 5. Degree of protection of relay

Description	Value
Front side	IP 54
Rear side, connection terminals	IP 20

Table 6. Environmental conditions

Description	Value
Operating temperature range	-10...+55^{0}C
Short-time service temperature range	-25...+70^{0}C (<16 h
Relative humidity	< 93%, non-condensing
Atmospheric pressure	86...106 kPa
Altitude	up to 2000 m
Transport and storage temperature range	-25...+70^{0}C

Table 7. Environmental tests

Description	Type test value	Reference
Dry heat test (humidity < 50%) • Working • Storing	 96 h at +70°C 96 h at +85°C	IEC 60068-2-2
Dry cold test • Working • Storing	 96 h at -25°C 96 h at -40°C	IEC 60068-2-1
Damp heat test, cyclic	2 cycles (12 h + 12 h) at +25°C...+55°C, Rh > 93%	IEC 60068-2-30
Change of temperature test	Cyclic : 3 hours at -25°C + 3 hours at +55°C Number of cycles : 5	IEC 60068-2-14

Table 8. Insulation tests

Description	Type test value	Reference
Dielectric test • Test voltage	 2 kV, 50 Hz, 1 min	IEC 60255-27
Impulse voltage test • Test voltage	 5 kV, 1.2/50 µs, 0.5 J	IEC 60255-27
Insulation resistance test • Isolation resistance	 > 100 M Ω at 500 V DC	IEC 60255-27

Technical Data

Table 9. Mechanical tests

Description	Value	Reference
Vibration tests • Response • Endurance / Withstand	 10...150 Hz, 0.075 mm / 0.5g, 1 sweep / axis 10...150 Hz, 1.0 g, 20 sweeps / axis	 IEC 60255-21-1, class I
Shock tests • Response • Endurance / Withstand	 5 g, 3 pulses in each direction 15 g, 3 pulses in each direction	IEC 60255-21-2, class I
Bump tests	10 g, 1000 bumps in each direction	IEC 60255-21-2, class I

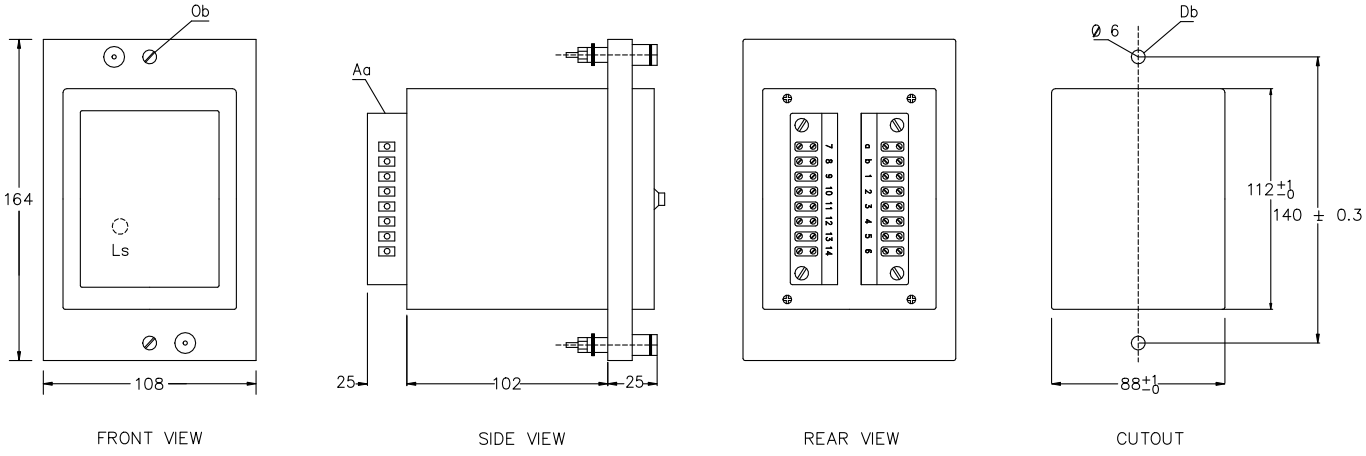
Table 10. Electromagnetic compatibility requirements

Description	Type test value	Reference
Electrostatic discharge test - Contact discharge - Air discharge	 6 kV 8 kV	 IEC 60255-26
Fast transient disturbance test - Common mode	 4 kV, 5/50 ns, 5kHz, Rs = 50 ohm	 IEC 60255-26
Slow damped oscillatory immunity test (1 MHz/100 KHz burst immunity test as per other product guide.) - Common mode - Differential mode	 2.5 kV 1 kV	 IEC 60255-26
Surge immunity test - All ports	2 kV (Line-to-earth) 1 kV (Line-to-line)	 IEC 60255-26

Dimesions and mounting

Dimensions and mounting
TCS relay is equipped with Flush mounting arrangement. The relay is supplied with necessary mounting hardware, facilitating the easy flush mounting on the panel.

The panel cut-out for flush mounting:
- Height: 112.0 ± 1.0 mm (140.0 ± 0.3 mm between center of mounting holes)
- Width: 88.0 ± 1.0 mm



Legend
Aa : Terminal Socket
Db: Mounting hole
Ob: Mounting screw
Ls: Operation signal

Fig. 5. Dimension of TCS in 1/2S case mounting

Selection and ordering data

Selection and ordering data

The relay type and serial number label identifies the relay. An order number label is placed on the side of the relay. The order number consists of a string of codes generated from auxiliary supply of the relay.

Use the ordering key information in Fig. 6 to generate the order number when ordering complete protection relay.

Example code

		1MYN569	697	-	E

#	Description	
1-7	**Product type**	
	Static	**1MYN569**
8-10	**Relay type**	
	TCS	697
11	**Vacant digit**	
	Vacant	-
12	**Auxiliary supply**	
	24V DC	A
	30V DC	B
	48V DC	C
	110-125V DC/AC	E
	220-250V DC/AC	G

Example order code: 1MYN569697-E

Figure 6. Ordering key for relay

Your ordering code:

Digit (#)	1-7	8-10	11	12
Code				

Connection and terminal diagram

Connection and terminal diagram

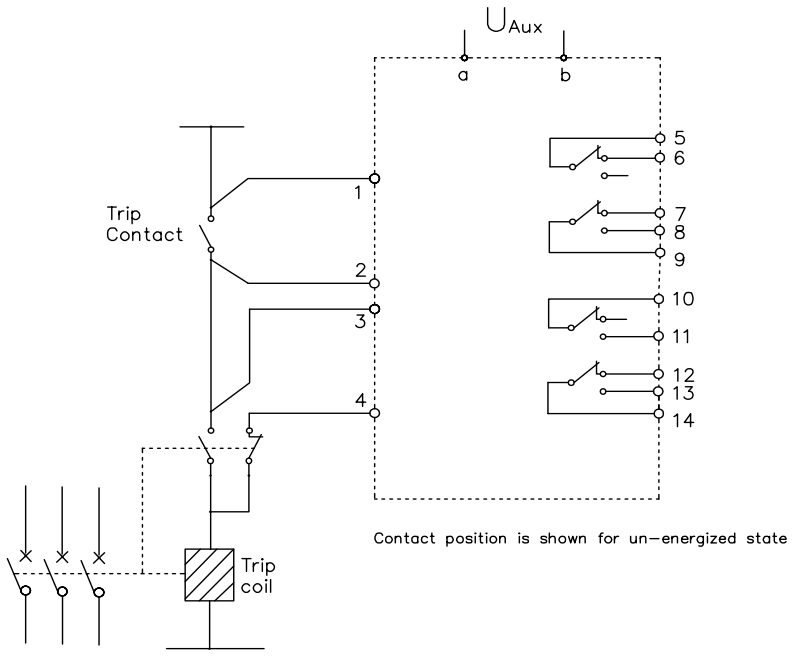


Fig.7 Terminal diagram of TCS relay

References
Thewww.abb.com/mediumvoltage portal offers you information about the medium voltage products and solutions.

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