



Powering Innovation




PROTECTION + AUTOMATION + CONTROL

# NON-DIRECTIONAL INVERSE TIME CURRENT RELAYS WITHOUT COMMUNICATION JNC 068 CALPS

**JVS ELECTRONICS PVT. LTD.**

#121, Manchanayakanahalli,  
Bangalore Mysore Highway, Bidadi,  
Ramanagara District - 562 109, Karnataka, India  
+91 94808 26272, +91 94808 26260  
bangalore@jvselectronics.in, www.jvselectronics.in

## FEATURES

- ◆ Programmable CT secondary current for 1A / 5A rating
  - ◆ Programmable system rated frequency (50/60Hz)
  - ◆ Display of Primary current
  - ◆ Available in many variants to suite main and back-up over-current protection schemes
  - ◆ Available in both Low load and normal load configurations
  - ◆ Choice of 6 IDMT curves and definite time with hi-set (two stage characteristics)
  - ◆ Cold load pick-up
  - ◆ MIPConS for preventing E/F element operation during single-phasing
  - ◆ Trip Coil Supervision Relay
  - ◆ Multi-short auto re-closer facility
  - ◆ Self supervision facility
  - ◆ Trip test facility
  - ◆ History of 200 latest comprehensive fault records along with settings
  - ◆ Latest 100 event records can be stored
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- ◆ Draw-out facility with inbuilt CT shorting
  - ◆ Standard dimension – 144mm x 144mm

## Application

The relay provides time graded phase and earth fault (2 stage) protection, (high impedance) restricted earth fault protection. Certain advanced features such as “Cold load pickup” and MIP-ConS improves the sensitivity, stability and availability of the system.

## PRINCIPLE OF OPERATION

### Over current relaying principles

The relay measures the line current from each of the line CTs and if the current exceeds the set threshold, then relay extends a trip signal after an operating time. The relay's “operating time” is determined by selecting “definite time” or one of the six “inverse time” characteristics. This principle of relaying is equally applicable to both line and earth fault protection elements (51N / 51G).

### Cold load pick-up

This feature can be useful in providing better selectivity in the operation of over current relays, by preventing them from operating, during inrush phenomenon.

### MIPConS - Management of Imbalance Phasor Control through Supervision

Under the existing practice of operating the distribution network in 2-phase mode (popularly known as single- phasing)for certain strategic purposes, conventional earth fault relays in substations would pick-up and trip the circuit breaker. This operation is considered by the engineers as an undesirable outcome of a planned current un-balance in the system. “MIPConS”, when enabled, automatically detects the single-phasing operation and restoration of 3-phase system. Consequently, the feature prevents “earth fault element” from extending trip command under single-phasing conditions.

### **Trip Test Facility**

The trip test will facilitate testing of relay operation without applying the input current. The trip test is useful to test the panel wiring and operation of breaker without any current. The trip contact will operate instantaneously. The phase and earth fault alarm contact will not operate during the trip test.

### **Restricted earth fault protection**

A simple earth fault protection may not provide adequate protection for transformer windings particularly when in the case of "Y" connected winding earthed with an impedance. The efficacy of protection is improved by employing restricted earth fault protection. The said protection scheme is prevalent even under the case of "solidly earthed systems". High-impedance protection scheme requires the residual current derived from the three line CTs to be balanced with the "neutral current" derived out of neutral CT. This unit protection scheme is generally sensitive only to the fundamental harmonic component of the measured current and has an "instantaneous time" as its operating characteristics.

### **Auto re-close facility**

Relay has a multi shot auto re-closer facilitates automation for breaker operation. Auto re-closer can be programmed to provide a maximum of five shots. "Dead time" starts when a trip signal is provided due to the occurrence of a fault involving L-L or L-G or L-L-G or L-L-L or L-L-L-G. After an elapse of a time interval equal to "dead time", closing command will be extended. The "reclaim time" timer starts at the instant when the "dead time" timer expires. If after extending the "breaker close" signal an over current fault was detected before the "reclaim time" timer reached its terminal count, then the relay understands that the fault in the system is still persisting and the over current relay will issue a trip signal. The relay tries to close the breaker for a maximum of the programmed number of shots before it chooses to lockout. The relay can be configured for independent trip sequence as IDMT or Definite time.

### **TCSR**

TCSR monitors trip coil continuously. If the trip circuit (or any coil) that is being supervised develops a snag, then the supervision relay extends an alarm without a delay. The relay monitors the trip coil under all the states of a breaker viz. close, open and during transition. The underlying mechanism of supervision is to perform hi- impedance measurement across two input circuits appropriately wired along with trip coil, 52A and 52B auxiliary contacts. 1-NO & 1-NC contacts have been provided for the purpose of alarm and SCADA. The current rating of these contacts is 5A at 24VDC / 230VAC.

### **Supervision functions**

Self supervision feature allows the operator to take note of any internal failure in the relay. An LED and an output contact is provided for annunciation purposes.

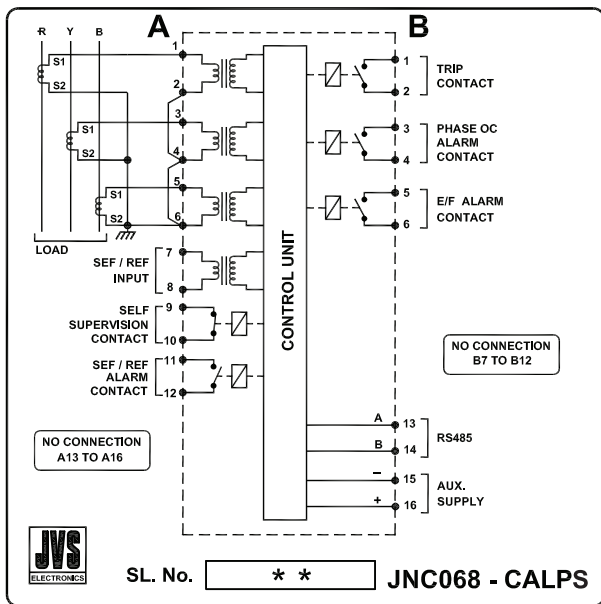
## TECHNICAL DATA

RELAY (ISD / IED features)	CONFIGURATION	
	MODEL: JNC 068 – CALPS <b>L = 1</b> means “suitable for optimal load”	MODEL: JNC 068 – CALPS <b>L = 2</b> means “suitable for low load”
<b>Relay rated current rating ( In )</b>	1A / 5A, site selectable Range for 1A: 50mA – 40A (5% to 4000%) Range for 5A: 250mA – 200A (5% to 4000%)	1A / 5A, site selectable Range for 1A: 20mA – 25A (2% to 2500%) Range for 5A: 100mA – 125A (2% to 2500%)
<b>Signal frequency</b>	50Hz / 60Hz, site selectable	50Hz / 60Hz, site selectable
<b>Aux. Supply</b>	** A = 1 implies 19.2V – 65V DC ** A = 2 implies 80V – 265V AC / DC	** A = 1 implies 19.2V – 65V DC ** A = 2 implies 80V – 265V AC / DC
<b>Operating characteristics</b>	1) 3.0s Normal Inverse 2) 1.3s Normal Inverse 3) 1.5s Very Inverse 4) 0.8s Extremely Inverse 5) 0.6s Extremely Inverse 6) 13.3s Long Inverse 7) Definite Time	1) 3.0s Normal Inverse 2) 1.3s Normal Inverse 3) 1.5s Very Inverse 4) 0.8s Extremely Inverse 5) 0.6s Extremely Inverse 6) 13.3s Long Inverse 7) Definite Time
<b>Operating Value</b>		
Phase OC (IDMT) – Low-set	5% to 2000% of 'In' in steps of 0.5%	2% to 1250% of 'In' in steps of 0.5%
Phase OC (Def time) – Low-set	5% to 3000% of 'In' in steps of 0.5%	2% to 1900% of 'In' in steps of 0.5%
Earth fault (IDMT) – Low-set	5% to 2000% of 'In' in steps of 0.5%	2% to 1250% of 'In' in steps of 0.5%
Earth fault (Def time) – Low-set	5% to 3000% of 'In' in steps of 0.5%	2% to 1900% of 'In' in steps of 0.5%
SEF	2% to 16% of 'In' in steps of 0.5%	2% to 16% of 'In' in steps of 0.5%
REF	2% to 80% of 'In' in steps of 0.5%	2% to 80% of 'In' in steps of 0.5%
Phase Hi-set	5% to 4000% of 'In' in steps of 0.5 %	2% to 2500% of 'In' in steps of 0.5 %
Earth fault Hi-set	5% to 4000% of 'In' in steps of 0.5%	2% to 2500% of 'In' in steps of 0.5 %
<b>TMS ( Ph &amp; E/F &amp; NDR )</b>	0.005 to 5.0 in steps of 0.005	0.005 to 5.0 in steps of 0.005
<b>Operating time</b>		
Definite time (Ph, E/F & SEF )	0 to 150.0s in steps of 0.01s (0 – Instantaneous)	0 to 150.0s in steps of 0.01s (0 – Instantaneous)
REF	< 30ms	< 30ms
Hi-set operating time ( Ph & E/F )	0 to 20s in steps of 0.01s (0 – Instantaneous) < 40ms	0 to 20s in steps of 0.01s (0 – Instantaneous) < 40ms
Reset Time	0 to 20 Sec in step of 0.01 sec	0 to 20 Sec in step of 0.01 sec
<b>Accuracy</b>		
Operating value(IDMT)	100% to 110%	100% to 110%
Operating value (Def time & SEF)	100% to 110%	100% to 110%
Operating value(REF)	Range for 1A: ±5% or ±3mA whichever is higher Range for 5A: ±5%	Range for 1A: ±5% or ±3mA whichever is higher Range for 5A: ±5%
Hi-set operating value	±5%	±5%
Drop-off / pick-up	~90%	~90%
Operating time(IDMT)	±5% for 3.0s NI, 1.3s NI, 13.3s LI characteristics. ±7% for 0.8s EI, 0.6s EI, 1.5s VI characteristics. REFR (instantaneous) < 30 ms.	±5% for 3.0s NI, 1.3s NI, 13.3s LI characteristics. ±7% for 0.8s EI, 0.6s EI, 1.5s VI characteristics. REFR (instantaneous) < 30 ms.
Operating time(Def time)	± 2% or ±30ms whichever is higher*	± 2% or ±30ms whichever is higher*
<b>ARR Setting</b>		
Maximum Re-closing Shots	5	5
Dead Time 1 to 5	0.5 s to 250s in step of 0.1 s	0.5 s to 250s in step of 0.1 s
Reclaim Time	10s to 250s in steps of 1s	10s to 250s in steps of 1s

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<b>Cold Load pickup setting</b>		
Cold Load pickup(CLP)	1 to 15 times of over-current settings in steps of 0.1	1 to 15 times of over current-settings in steps of 0.1
CLP Delay	0.05s to 1.0s in steps of 0.01s	0.05s to 1.0s in steps of 0.01s
<b>TCSR</b>		
Measured Current	< 1mA	< 1mA
Operating Time	1.16s	1.16s
Reset Time	64ms	64ms
<b>Records</b>		
Number of DR	Two	Two
Duration of DR	0.37s Pre-fault and 0.36s Post-fault	0.37s Pre-fault and 0.36s Post-fault
Event record	100 event	100 event
Fault record	200	200
<b>Potential free Contact rating</b>		
<i>TRIP CONTACTS</i>		
Make & carry	1250VA at maximum 10A or 440V AC / 220V DC	1250VA at maximum 10A or 440V AC / 220V DC
Break capacity	2300VA at maximum 10A or 440V AC / 250V DC	2300VA at maximum 10A or 440V AC / 250V DC
<i>ALARM &amp; Self Supervision Contacts</i>	5A at 24V DC / 230V AC	5A at 24V DC / 230V AC
<b>Contact Durability</b>		
Electrical	100,000 operations	100,000 operations
Mechanical	1000,000 operations	1000,000 operations
<b>Over load rating (Current input)</b>	2 times rated continuous 20 times rated for 3s 40 times rated for 1s 100times rated for 160ms	2 times rated continuous 20 times rated for 3s 40 times rated for 1s 100times rated for 160ms
<b>Burden</b>		
Current input	0.4VA per phase (Rated 5A) 0.05VA per Phase (Rated 1A)	0.4VA per phase (Rated 5A) 0.05VA per Phase (Rated 1A)
Aux. Voltage input	Less than 10W (Non operated) Less than 13W (Operated)	Less than 10W (Non operated) Less than 13W (Operated)
<b>Mechanical Dimensions</b>		
Weight	2.5 kg (Approximately)	2.5 kg (Approximately)
Case Size	Fascia 144mm x144mm;depth 232mm	Fascia 144mm x144mm;depth 232mm
Installation	Flush mounting	Flush mounting
Panel cutout	138mm x 138mm	138mm x 138mm
*When the energizing quantity is ramped from a non-zero value to the operating value		

**TERMINAL DIAGRAM**



**ORDERING INFORMATION**

Relay type : JNC 068 - CALPS

Communication First digit: C

: 1 - Without MODBUS communication over RS 232 & RS 485

Auxiliary supply Second digit: A

: 1 - 19 to 65V DC

: 2 - 80 to 265V AC / DC

Nature of Load (on feeder) Third digit: L

: 1 - Normal Load

: 2 - Low Load

Protection Element Fourth digit: P

Configuration	3 O/C	E/F (51G)	E/F (51N)	SEF	REF	ARR	DR
P = 0	●		●				
P = 1	●		●	●			
P = 2	●		●		●		
P = 3	●	●					
P = 5	●		●				●
P = 6	●		●	●			●
P = 7	●		●		●		●
P = 8	●	●					●
P = q	●		●			●	
P = r	●		●	●		●	
P = s	●		●		●	●	
P = t	●	●				●	
P = v	●		●			●	●
P = w	●		●	●		●	●
P = x	●		●		●	●	●
P = y	●	●				●	●

**Note:**

1) 51N is derived out of the phasor sum of the 6 phase line currents whereas 51G derives its input directly from the a CT measuring the residual current through the neutral.

*Trip Coil Supervision*

*Fifth digit: S*

S configuration	Reserve	Reserve	MIPCons	TCSR
P=0				
P=1				●
P=2			●	
P=3			●	●