

Numerical Under & Over Voltage Protection

MVT 181

Description

Two Elements

MVT 181 is a numerical true RMS single pole relay consists of two elements. Each element can be selected for under voltage function or over voltage function or switched off. The characteristics setting, voltage setting and time multiplier setting are independently settable for each element and the voltage setting is in terms of voltage. Hence this relay can be used as a two stage under voltage or two stage over voltage protection.

Multiple Characteristics

There are four operating characteristics for over voltage function and two operating characteristics for under voltage function.

Overvoltage Characteristics

- Definite Time Lag (DTL)
- Long Time Inverse (LTI)
- Extremely Inverse 1 (EI 1)
- Extremely Inverse 2 (EI 2)

Undervoltage Characteristics

- Definite Time Lag (DTL)
- Extremely Inverse 1 (EI 1)

Two elements

- Two stage O/V
- Two stage U/V
- Or one O/V and one U/V

Timer

The relay is provided with two status inputs, one of which is to be connected across the circuit breaker auxiliary contact 52a. From this the circuit breaker closed or opened condition is found out. This information is used to introduce a time delay between successive switching of the capacitor banks which allows the capacitor bank to discharge to a safer value after disconnected from a live network. This timer function is a settable one and its output (N/O) contact is used in the closing circuit of the circuit breaker. The completion of this time delay is also indicated by 'TIMER' LED in the front fascia. In addition the same status input can be used for **Trip circuit supervision** also.

During other under voltage and over voltage applications this timer function can be disabled or used as an independent timer function.

Trip Circuit Supervision

Pre-closing and post-closing supervision of the trip circuit and trip supply is possible with this relay. A low value of DC current is passed through the entire trip circuit to monitor the trip coil, its auxiliary switch and the associated wiring. One of the status input is connected across the tripping contact and another status input is connected across the 52a contact (axiliary contact of the circuit breaker) in series with the trip coil. During trip circuit fail condition the monitoring current flow ceases and the energised

status input drops off and the relay gives a contact output to indicate this condition. In addition to this contact an LED is provided in the front fascia to indicate the 'T.C. FAIL' condition. A time delay of approximately 400 msec has been given to avoid false trip circuit fail indication at the time of normal tripping. Thus trip circuit supervision is the integral part of the relay. If this function is not required the same can be put off in the setting menu.

Design

The MVT 181 Protection unit consists of the following modules within its compact dimensions.

- Input Module
- Power Supply and Output Relay module
- Measuring Module
- Front Fascia

The three modules viz. Input, Power supply and Measuring modules are plugged into the Front fascia which house switches, LEDs and LED display for the human machine interface. All PCBs are well protected from one another and from external environment with best shielding for better electromagnetic compatibility and housed in the enclosed chassis, which is withdrawable from the outer case.

This relay has independent power supply provided with galvanic isolation. The relay is suitable for wide range of auxiliary input supply.



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EASUN REYROLLE

The reduced output from the voltage transformer is sampled at the rate of 16 samples per cycle and digitised by means of analog to digital converter.

The digitised signals are processed numerically by means of microcontroller to drive the Root Mean Square (RMS) value of the input signal. Based on this and the settings, decisions are taken to either elapse the time for inverse characteristics or definite time to operate the trip output relay.

The two status inputs incorporates highly isolated opto-couplers. The circuit is suitable for 18-36 V DC supply and external resistors are supplied for higher DC voltages.

Indication

The relay is provided with easy Human Machine Interface with four push switches and 6 seven-segment LED displays. The seven-segment display is used to view the settings and tripping details.

Applications

- AC Generators
- Transmission lines
- Capacitor banks
- Distribution feeders
- Auto-transfer schemes
- Complex protection schemes
- Breaker trip coil supervision

Features

Protection

- 2 stage under/over voltage (27/59)
- Numerical, true RMS measurement
- Wide voltage setting ranges
- Multiple inverse characteristics (160)

Control

- The relay has 8 output contacts
- Trip/alarm for both elements 2 N/O
- Common starter for both elements 1 N/O
- Element 1 operated 1 N/O
- Element 2 operated 1 N/O
- Protection Unhealthy 1 N/C
- Timer 1 N/O
- Trip circuit fail 1 N/O
- Timer for capacitor bank to switch to safer value before successive switching of the breaker

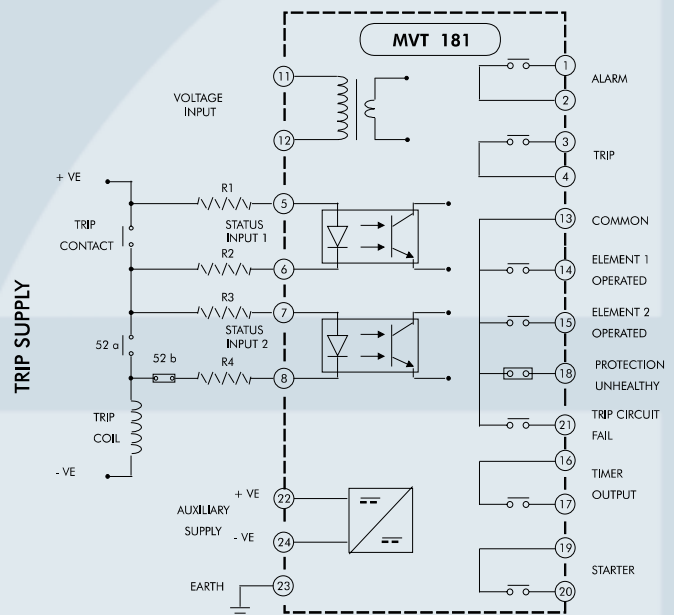
Monitoring

- Trip circuit supervision
- Self-monitoring facility

User Interface

- Seven segment LED display
- LED indications
- Sealable front cover to prevent unauthorised access

Typical Wiring Diagram



Other Features

- Drawout modular case
- Compact design
- Non-volatile memory for trip indication

Technical Information

Voltage Input Rating upto 230V A.C (same terminals)
Frequency (Fn) 50 Hz Nominal

Auxiliary Supply

Nominal Voltage	Voltage Range
24/30/48/110V DC	18-135VDC
48/110/220V DC	43-280VDC
(or) 110V AC	

DC Input

Nominal Voltage	Voltage Range
24/30V DC	18 - 36V DC

For higher status input voltages external dropping resistors will be supplied.

Settings

Element 1 : UV, OV or OFF
 Element 2 : UV, OV or OFF

Voltage Setting

5V to 275 V in steps of 1 V



Characteristics Setting

When the element is set as Under Voltage

1. Definite Time Lag (DTL) characteristics 0 to 200 secs in steps of 0.1 sec
2. Extremely Inverse 1 (EI 1) characteristics

$$t = \frac{5}{\left(1 - \left(\frac{V}{V_s}\right)^2\right)^2} \times T_m$$

When the element is set as Over Voltage

1. Definite Time Lag (DTL) characteristics 0 to 200 secs in steps of 0.1 sec
2. Long time inverse characteristics

$$t = \frac{40}{\left(\left(\frac{V}{V_s}\right) - 1\right)^2} \times T_m$$

3. Extremely inverse 1 (EI 1) characteristics

$$t = \frac{5}{\left(\left(\frac{V}{V_s}\right)^2 - 1\right)^2} \times T_m$$

4. Extremely inverse 2 (EI 2) characteristics

This is based on ANSI/IEEE C37.99 and IEC871-1. The standard time delay for various multiples of over voltage is given as under for time multiplier setting of 1.0

Multiples of setting voltage	Operating time(secs)
1.15	1800
1.2	300
1.3	60
1.4	15
1.7	1
2.0	0.3
2.2	0.12

Where

- t - Operating Time in secs
- V - Fault voltage
- Vs - Setting voltage
- Tm - Time multiplier setting

Time Multiplier Setting

0.025 to 1.0 in steps of 0.025 (for all inverse characteristics)

Time setting if DTL is selected

0 to 200 secs in steps of 0.1 sec

Timer for Closing Interlock

0 to 600 secs in steps of 1 sec or OFF

Trip Circuit Supervision

ON or OFF

Output Contacts

- The relay has 8 output contacts
- Trip/alarm for both elements 2 N/O
- Common starter for both elements 1 N/O
- Element 1 operated 1 N/O
- Element 2 operated 1 N/O
- Protection Unhealthy 1 N/C

- Timer 1 N/O
- Trip circuit fail 1 N/O
- Timer for capacitor bank to switch to safer value before successive switching of the breaker

Contact Rating

Carry continuously	5A AC rms or DC
Make & Carry	20A for 0.2 sec
Break	50W DC with max.of300Vor5A DC L/R ≤ 40 ms

Indication

Green LED	Protection Healthy
Yellow LED	Starter Indication
Red LED	Trip Indication
Red LED	Trip circuit fail
Red LED	Completion of timer
Red LED (3 mm)	Submenu
7 segment Display	Settings Display and Starter/Trip indication

Burden

AC Burden	< 0.015 VA at 63.5V
	< 0.035 VA at 110V
	< 0.15 VA at 230V

DC Burden

Quiescent	5W (DC)
	12VA (AC)

Environmental

Temperature	IEC 60068-2-1/2
Operating Range	-10° C to +55° C
Storage Range	-25° C to +70° C

Humidity	IEC 60068-2-3
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4 days at 40° C and 93% RH

Transient Overvoltage	IEC 60255-5
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5KV, 1.2/50 μs, 0.5joules between all terminals and earth or between any two terminals without damage or flashover

Insulation	IEC 60255-5
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2.0 KVrms for 1 min between all terminals and earth
 2.0 KVrms for 1 min between independent circuits
 1.0 KVrms for 1 min across normally open contacts

High Frequency Disturbance	IEC 60255-22-1 Class III
	2.5 KV Common (Longitudinal) mode
	1.0 KV Series (Transverse) mode

Electrostatic Discharge	IEC 60255-22-2 Class III
	6 KV Contact Discharge
	8 KV Air Discharge

Radio Frequency Interference	IEC 60255-22-3 Class III
	20 MHz to 1000MHz, 10V/m

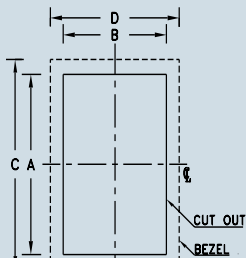
Fast Transient	IEC 60255-22-4 Class IV
	4 KV, 5/50 ns, 2.5 KHz repetitive

Vibration (Sinusoidal)	IEC 60255-21-1 Class I
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Shock and Bump	IEC 60255-21-2 Class I
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Cutout Details



PART	CASE SIZE	CUT OUT		BEZEL	
		A	B	C	D
01	2/3V	149.5	148	170	170

Note:

1. All dimensions are in mm
2. All dimensions are measured equidistant from centre line
3. Maximum depth of equipment inside panel : 200mm

Ordering Information

- Auxiliary supply range
- Status input supply

Qualification

ISO 9001 - 2000

The policy of Easun Reyrolle is one of continuous improvement and development. The company therefore reserves the right to supply equipment, which may differ slightly from that described and illustrated in this publication.

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