Genesis Range

Numerical Biased Differential Protection

MIB 202

Description

MIB 202 takes the current inputs from both the ends of two winding power transormer and auto transformer, it is working on current differential principle. It provides stability against magnetic inrush conditions. Load/through fault stability is achieved through bias setting provided in the relay. It operates only for internal faults.

Design

The MIB 202 protection consists of the following modules with in its compact dimensions.

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

The three modules viz. Input, power supply and measuring module are plugged into the front fasia which houses switches, LED's 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 chasis, which is with-drawable from the outer case. The relay has 6 input current transformers. The reduced output from current transformer is digitized by means of analog to digital converter.

The sampled signals are processed by means of micro controller to derive the RMS value I_1, I_2. Here I_1 represents the current on HV side and I_2 represents the current on LV side computed after any necessary phase and amplitude modification has been applied. From the values of I_1 and I_2 the relay will process and computes operate and restraint signals. Based on this and the settings, decisions are taken either to operate or to restrain the relay.

The same relay is suitable for 1A and 5A rating. Different rating can be adapted for HV and LV side.

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

Vector Group Compensation

The line currents are combined to correct for phase and magnitude differences and to remove zero sequence components. These corrections can be applied by selecting the suitable interposing CT configuration settings.

Magnetic Inrush Inhibit

Second harmonic quantities are calculated from the signal I_1-I_2 to provide an inhibit signal, which prevents the protection from operation for magnetic inrush conditions.

Biased Differential

The relay is provided with triple slope characteristics.

The zero slope characteristics, which extend upto load current, will give better sensitivity during internal fault with load current.

The middle part of the characteristic (normal slope) is used to have stability for normal through fault condition. Since the bias slope is variable in the relay, this allows operating current to increase automatically to the extent it is required (due to CT mismatches). Because of this, the relay senses internal faults in a better way during an external fault.

The last portion of the characteristics is with high slope, which gives more stability during CT saturation for heavy through fault.

Differential Highset

The relay is also provided with differential highset protection. The highset protection operates when the DC removed RMS value of the signal $|I_1-I_2|$ is greater than a preset value which can be varied. If not required, highset can also be put OFF. The highset is not restrained by the magnetic inrush detector.

Numerical Biased Differential Protection Relay - MIB 202

EASUN REYROLLE

Over Excitation

The MIB202 relay contains filtering circuit, which attenuate the 5th harmonic. This allows the relay to remain stable during over excitation condition with application of suitable relay setting.

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.

There are four LED's in front fascia.

- Protection Healthy-Green
- Trip indication - Red
- High set trip - Red
- Sub menu - Red (to set the relay)

Current Transformer Requirement

For high-speed operation under all fault conditions the minimum current transformer knee point voltage should equal or exceed

$V_k \geq 4 * I_F (A + C)$

Where,

I_F = Either the maximum three phase through-fault current (as limited by the transformer impedance) or the high-set setting, whichever is greater

A = The secondary winding resistance of each star connected CT

C = The CT secondary loop lead resistance for internal earth faults

Applications

- Two winding power transformers
- Auto transformers
- Biased differential protection for generators

Features

Protection

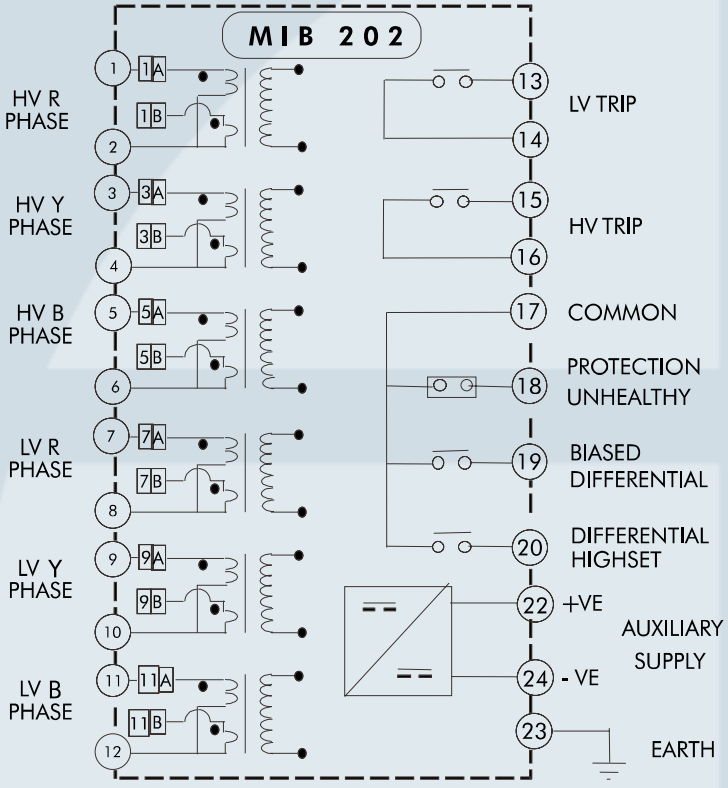
- Biased differential (87)
- Instantenous differential highset (87 HS)
- Numerical, true RMS measurement
- Integral current amplitude multiplier and vector group compensation
- 3-slope adjustable bias setting
- Immune to magnetic inrush
- Interposing CTs are not required

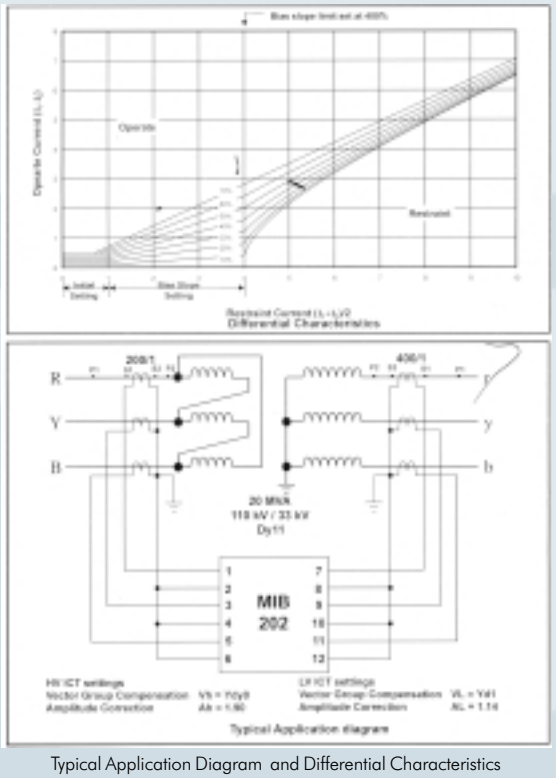
Control

The relay has 5 output contacts

- Trip (biased diff & highset)
  HV trip and LV trip 2N/O
- Alarm
  Differential Highset 1N/O
  Biased Differential 1N/O
- Protection unhealthy 1N/C

Typical Wiring Diagram





Typical Application Diagram and Differential Characteristics

Monitoring
- Self-monitoring facility

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

Other Features
- Both 1A & 5A CT inputs in one relay
- Both DC & AC auxiliary supply available
- Drawout modular case
- Compact design
- Non-volatile memory for trip indication

Technical Information

CT Input Rating
1A & 5A
(Any one can be adapted at site)

Frequency 50Hz

Auxiliary Supply

Nominal Voltage	Voltage range
30/48/110V DC	24 - 135V DC
110/220V DC or 110V AC	88-280V DC

Settings
Current Differential
Initial differential setting

I 10% to 50% of I_n in steps of 5%

Bias slope

bS 10% to 70% in steps of 5%

Bias slope limit

SL 200% to 2000% of I_n in steps of 100%

Current amplitude correction for HV winding

Ah 0.50 to 2.50 in steps of 0.01

Current amplitude correction for LV winding

AL 0.50 to 2.50 in steps of 0.01

Vector group compensation for HV winding

Vh Yy0, Yy2, Yy4, Yy6, Yy8, Yy10, Yd1, Yd3, Yd5, Yd7, Yd9, Yd11, Ydy0 and Ydy6

Vector group compensation for LV winding

VL Yy0, Yy2, Yy4, Yy6, Yy8, Yy10, Yd1, Yd3, Yd5, Yd7, Yd9, Yd11, Ydy0 and Ydy6

Differential Highset

H Off, 400% to 2500% of I_n in steps of 100%

Characteristics
The relay operates when

$|I_1-I_2|>I$ and

$|I_1-I_2|>bS \times \left(\frac{I_1+I_2}{2}\right)$ and

$|I_1-I_2|> \sqrt{\frac{X^2-K^2}{2}}$ for $X \geq (SL)$

Where,

I = Current seting

$X = \left(\frac{I_1+I_2}{2}\right)$

$K^2 = (SL)^2 - 2(bS)^2(SL)^2$

SL = bias slope limit

bS = bias slope

Typical Operating Time

Current diferential	30ms at 2 x setting
Highset overcurrent	25ms at 2 x setting

Output Contacts
The relay has 5 output contacts

• Trip (biased diff & highset)	
HV trip and LV trip	2N/O
• Alarm	
Differential Highset	1N/O
Biased Differential	1N/O
• Protection unhealthy	1N/C

Contact Rating

Carry continuously	5A AC rms or DC
Make and carry	20A for 0.2 sec

Burden
AC Burden

5 A Rating	≤ 0.4VA
1 A Rating	≤ 0.05VA

Auxiliary Supply Input
Quiescent (typical) 6 W

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
4 days at 40°C and 93%RH

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

Insulation IEC 60255-5
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 1000 MHz, 10V/m

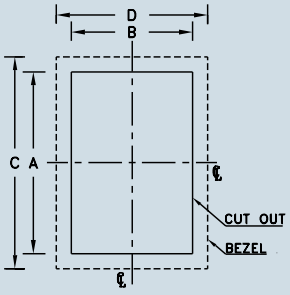
Fast Transient IEC 60255-22-4 class III

2 KV , 5/50 ns, 2.5 KHz repetitive

Vibration (Sinusoidal) IEC 60255-21-1 class I

Shock & bump IEC 60255-21-2 class I

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

- Relay rating
- Auxiliary supply range

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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