MD32-G

PERCENTAGE BIASED GENERATOR DIFFERENTIAL RELAY

Three-phase percentage biased differential protection relay for generators and rotating machines, with stator earth fault or restricted earth fault element.

Measurement of the System-frequency differential current with DC offset and harmonic components rejection

Protective Functions

- **F50/51** : Phase Overcurrent protection.
- **F87N** or
  F64S : Earth Fault or Restricted Earth Fault protection.
- **F87** : Phase Differential protection.
- **F51BF** : Breaker Failure protection.

- Dual slope programmable percentage bias curve.
- Harmonic Restraint.

Measurements

- Real Time Measurements
- Maximum Demand and Inrush Recording
- Trip Recording (last 5 trips with date & time).

Control

- 5 Output Relays (Programmable)
- 3 Digital Inputs

Technical Characteristics

- Complete autodiagnostic program
- Display 8 characters
- 8 Leds for signalization

Communications

- RS485 Serial communication port on rear side
- Modbus RTU communication Protocol

Mounting

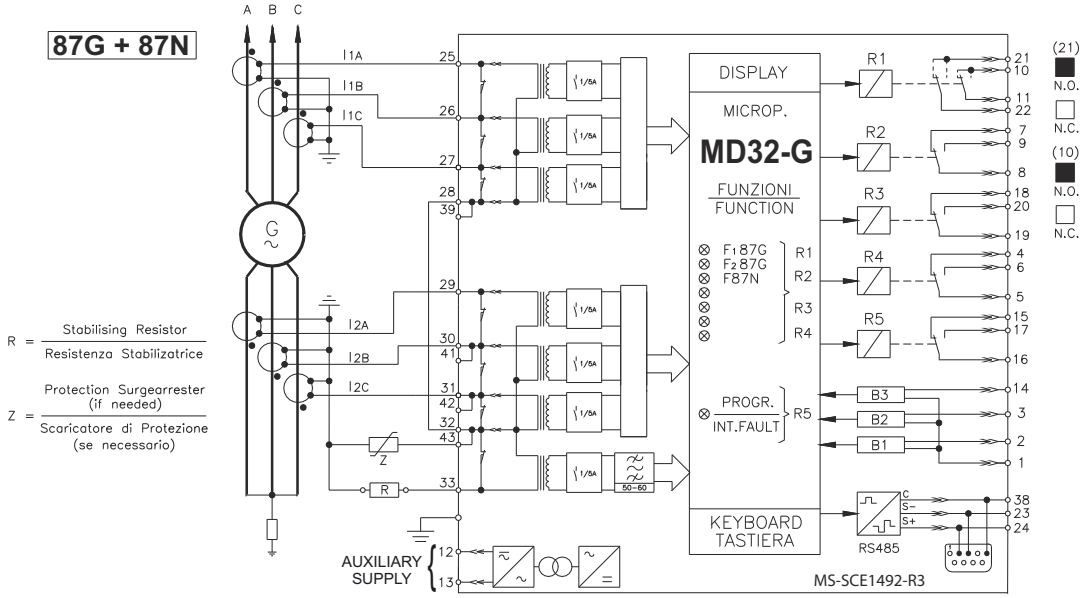
- 2 Module box
- P44 protection case (on request IP54)
- Totally draw-out execution.

Power Supply Ratings

- Type 1 : 24V(-20%) / 110V(+20%) a.c. - 24V(-20%) / 125(+20%) d.c.
- Type 2 : 80V(-20%) / 220V(+20%) a.c. - 90V(-20%) / 250(+20%) d.c.

Software

- MScom - program interface for device management



N15-ING-Rev.04

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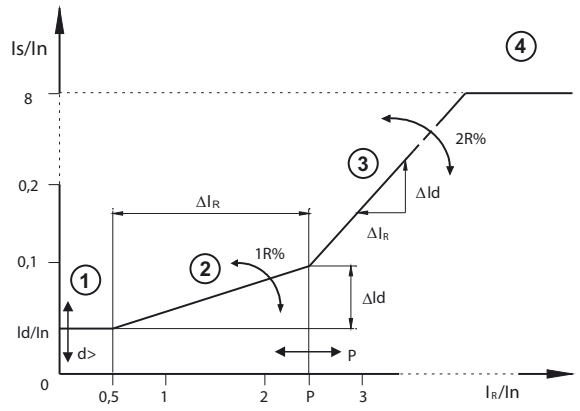
Protection Relays

MD32-G

Programmable Input Quantities		
Fn = System frequency	: (50 - 60) Hz	
In = Rated primary current of phase CTs	: (0 - 9999)A	step 1A
F87G : Differential Protection		
Current setting range	: d> = (0.02 ÷ 0.2)In	step 0.01
Istantaneous output	: ≤ 30ms	
2nd Harmonic restraint level	: 2H = (0.1 ÷ 1.0)Id	step 0.01Id
First percent bias (0,5<I_R/In<P)	: 1R = (2 ÷ 20)%	step 1%
Second percent bias (I_R/In>P)	: 2R = (5 ÷ 50)%	step 1%
Point of slope variation	: P = (1 ÷ 3)	step 0.1
F50/51 : Overcurrent Protection		
Current setting range	: I> = (1 ÷ 5)Ist	step 0.01In
Definite time trip delay	: tI> = (0.05 ÷ 9.99)s	step 0.01s
Instantaneous output	≤ 0.03s	
F87N / F64S : Stator Earth Fault		
Current setting range	: do = (0.01 ÷ 1)Ion	step 0.01Ion
Trip time delay	: tdo = (0.05 ÷ 9.99)s	step 0.01s
Instantaneous output	≤ 0.03s	
F51BF : Breaker Failure Element		
Trip time delay	: tBF = (0.05 ÷ 1.00)s	step 0.01s



Is = Effective relay's operation differential current
Id = Relay's set differential current
IR = Relay's through current

$$R\% = 100\,\frac{\Delta I_d}{\Delta I_R}$$

① $\frac{Is}{In} = \frac{I_d}{In}$

② $\frac{Is}{In} = \frac{I_d}{In} + \left(\frac{I_R}{In} - 0{,}5\right) \cdot \frac{1R\%}{100}$

③ $\frac{Is}{In} = \frac{I_d}{In} + \frac{(P - 0{,}5)\,1R\%}{100} + \left(\frac{I_R}{In} - P\right)\frac{2R\%}{100}$

④ $\frac{Is}{In} \cong 8$

Order Code - Example :			
MD32-G	1	2	1
	Power supply	Phase Rated Input Current	R1 Configuration for standard outputs
	1 = Type 1	1 = 1A	1 = (21-22) N.O. - (10-11) N.O. - Standard
	2 = Type 2	2 = 5A	2 = (21-22) N.O. - (10-11) N.C.
			2 = (21-22) N.C. - (10-11) N.O.
			2 = (21-22) N.C. - (10-11) N.C.

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KNORR-BREMSE

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