PROTECTION RELAYS

DTMR3-TX

Differential transformer 3-way relay

Three-phase percentage biased differential and Restricted Earth Fault protection relay for 3 winding transformers.

The real time measurements of the primary values of the input quantities are continuously available on the relay's display as well as via the serial communication bus from the MSCom interface program. Setting of the relay can be done either through Front face Keyboard or via serial communication bus from MSCom interface program. Control of the associated circuit breaker can be done either from the relay keyboard or via serial communication bus from MSCom interface program. Settings, events and oscillographic recordings are stored in a non-volatile memory (E2PROM).

Besides the normal Watchdog and Powerfail functions, a comprehensive program of self-test and self diagnostic provides:

- Diagnostic an functional test with checking of program routines and memory contents, run every time the auxiliary power is switched on.
- Dynamic functional test running during normal operation every 15 min.
- Complete Test activated by the keyboard or via the communication bus either with or without tripping of output relays.

Any internal fault detected is indicated by a fault message on the display and by deenergization of R5 relay.

MICROELETTRICA

Protective Functions

- F50/51 : Two phase fault levels (side 1 and side 2)
- F87T : Two phase differential level
- F51BF : Breaker Failure protection

Measurements

- A,IB,IC : Current
- dA,dB,dC : Differential current
- 2H,5H : 2nd & 5th Harmonic detection current
- Io : Neutral current

Recording

- Event Recording (last 100 events)
- Trip Recording (last 20 trips) complete with cause of tripping and values of the input quantities at the moment of trip
- Oscillographic recording of input quantities (8 channels, 32 sample/cycle, 3 sec each)

Control

- 6 Output Relays user programmable
- 4 Digital Inputs user programmable
- Blocking input and Blocking output for pilot wire selectivity coordination
- Time tagging resolution 1ms.
- Trip circuit supervision
- Associated Circuit Breaker control (OPEN / CLOSE)
- Breaker interruption energy $\sum i^2t$
- Complete autodiagnostic program with dedicated relay
- 2 Setting programs
- Synchronization with other relays

Technical Characteristics

- Graphical Display (128x64 dot)
- 4 Leds for signalization
- Multilanguage Display (English/Italian standard, available - other on request)

Power Supply Ratings

- Autoranging multivoltage power supply
- Type 1 : 24V(-20%) / 110V(+15%) a.c. - 24V(-20%) / 125V(+20%) d.c.
- Type 2 : 80V(-20%) / 220V(+15%) a.c. - 90V(-20%) / 250V(+20%) d.c.

Communications

- 1 RS485 Serial communication port on rear side
- 1 RS232 Serial communication port on front panel
- Modbus RTU / IEC870-5-103 Communication Protocols
- Canbus port for external additional modules

Expansion Modules (optional)

- "UX10-4" 10 Digital Inputs and 4 Output Relays
- "14DI" 14 Digital Inputs
- "14DO" 14 Output Relays

Execution

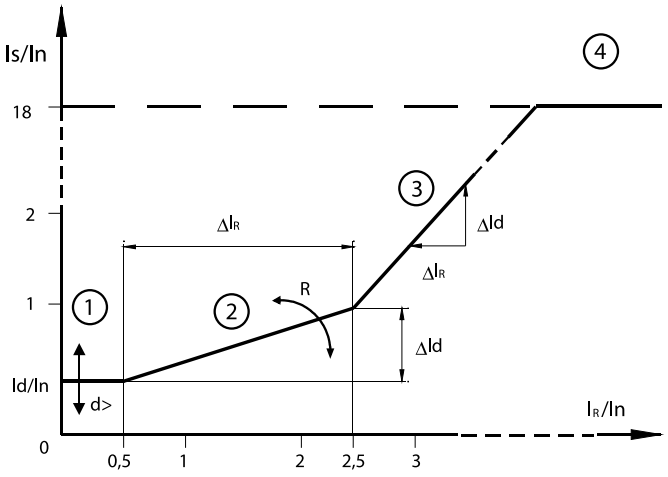
- 2 Module box. (3 modules with 1 expansion, 4 modules with 2 expansion)
- IP44 protection case (on request IP54).
- Totally draw-out execution.

Software

- MSCom2 Program interface for device management

1 - F87T : Low-set Phase Differential		
Current setting range	1d> = (0.1 ÷ 0.5)In	step 0.01In
Instantaneous output	≤0.03s	
Bias current selector	Longitidinal - Latitudinal side 1 - Latitudinal side 2	
Bias percentage	R = (10 ÷ 50)%	step 1%
2nd Harmonic restraint level	2H = (0.1 ÷ 0.5)	step 0.01
5th Harmonic restraint level	5H = (0.1 ÷ 0.5)	step 0.01
Time during which harmonic restraint level can be lowered at transformer energisation	tH = (0.01 ÷ 90)s	step 0.01s
2nd Harmonic restraint level reduction during tH	R2H = (0.1 ÷ 1.0)2H	step 0.01
5th Harmonic restraint level reduction during tH	R5H = (0.1 ÷ 1.0)5H	step 0.01

$$I_R = \frac{I_1 + I_2 + I_3}{2} \text{(Latitude)} \qquad \text{OR} \qquad I_R = \frac{I_1 + I_2}{2} \text{(Longitute)}$$



Is = Effective relayís operation differential current
Id= Relay set differential current = [d>]
IR = Relayís through current

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

① $\frac{Is}{In} = \frac{I_d}{In}$

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

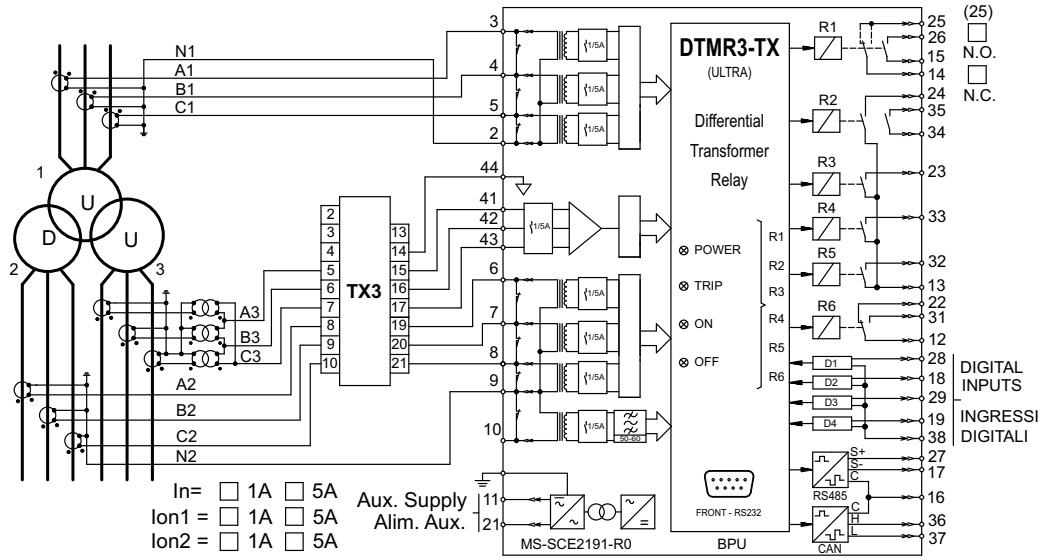
③ $\frac{Is}{In} = \frac{I_d}{In} + \frac{2R\%}{100} + \left(\frac{I_R}{In} - 2{,}5\right)$

④ $\frac{Is}{In} \cong 18$

2 - F87T : High-set Phase Differential		
Current setting range	2d> = (2 ÷ 20)In	step 0.01In
Detection time	6ms < t < 20ms	
Peak current detection with DC offset restraint		
1F - 50/51 (1I>): First Overcurrent Element - Side 1		
Current setting range	1I> = (0.1 ÷ 4)In	step 0.01In
Definite trip time delay	t1I> = (0.02 ÷ 100)s	step 0.01s
Instantaneous output	≤0.03s	
Time current curves	Indep.Definite Time (D), IEC (A / B / C), IEEE (MI / VI / I / EI / SI)	
2F - 50/51 (1I>>): Second Overcurrent Element - Side 1		
Current setting range	1I>> = (0.1 ÷ 20)In	step 0.01In
Definite trip time delay	t1I>> = (0.02 ÷ 100)s	step 0.01s
Instantaneous output	≤0.03s	
Automatic doubling of level 1I>> on inrush	1I>>x2 = ON/OFF	
1F - 50/51 (2I>): First Overcurrent Element - Side 2		
Current setting range	2I> = (0.1 ÷ 4)In	step 0.01In
Definite trip time delay	t2I> = (0.02 ÷ 100)s	step 0.01s
Instantaneous output	≤0.03s	
Time current curves	Indep.Definite Time (D), IEC (A / B / C), IEEE (MI / VI / I / EI / SI).	
2F - 50/51 (2I>>): Second Overcurrent Element - Side 2		
Current setting range	2I>> = (0.1 ÷ 20)In	step 0.01In
Definite trip time delay	t2I>> = (0.02 ÷ 100)s	step 0.01s
Instantaneous output	≤0.03s	
Automatic doubling of level 1I>> on inrush	2I>>x2 = ON/OFF	
1F - (Wi): Circuit Breaker Energy Maintenance		
Conventional interruption current	Ii = (0.1 ÷ 99)In	step 0.1In
Max Energy before maintenance	Wi =(1÷ 9999)	step 1

Trip Circuit Supervision Element		
Independent time delay	ts = (0.1 ÷ 100)s	step 0.01s
Trip circuit voltage	(24 ÷ 250)Vdc	
Breaker Failure Element		
Trip time delay	tBF = (0.05 ÷ 0.75)s	step 0.01s

Connection Diagram



Typical Characteristics		
Accuracy at reference value of influencing factors	1% In - 0.1% On	for measurements
2% +/- 20ms	for times	for times
Rated current	In = 1A or 5A; On = 1A or 5A	
Current overload	80 In for 1 sec; 4 In continuous	
Burden on current inputs	Phase: 0.01VA at In=1A; 0.2VA at In=5A	
Neutral: 0.03VA at In=1A; 0.2VA at In=5A	<10 VA	
Output Relays	rating 5 A; Vn = 380 V A.C. resistive swictching = 1100W (380V max) make= 30 A (peak) 0.5 sec., break = 0.3 A, 110 Vcc, L/R = 40 ms (100.000 op.)	

Order Code - Example					
DTMR3-TX	1	2	1	1	2
	Power Supply	Phase Rated Input Current	Configuration R1 (14-25)	1st Expansion module	2nd Expansion module
	1 = Type 1	1 = 1A	1 = N.O.	1 = None	1 = None
	2 = Type 2	2 = 5A	2 = N.C.	2 = UX10-4	2 = UX10-4
				3 = 14DI	3 = 14DI
				4 = 14DO	4 = 14DO

The technical specifications reported are not binding and they should be agreed in the contract.

For further technical information on our products visit www.microelettrica.com

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