



Numerical Relays

For Protection, Monitoring & Control

ABOUT US



Switchgear Factory, Navi Mumbai



Switchgear Factory, Ahmednagar



Switchgear Factory, Vadodara

L&T Electrical & Automation (E&A) is a market leader for electrical distribution, monitoring and control solutions in the low voltage category.

Popular among customers as L&T Switchgear, E&A offers a wide range of low and medium voltage switchgear, motor starters, electrical systems, industrial automation, building electrical solutions, energy management solutions, electrical modernization solutions and metering solutions. Its products and solutions cater to key sectors of economy like industries, utilities, infrastructure, building and agriculture.

E&A's manufacturing operations at Navi Mumbai, Ahmednagar, Vadodara, Coimbatore and Mysuru in India adhere to global practices of excellence and receive support from well-equipped in-house design and development centres as well as tooling facilities that contribute to precision in manufacturing.

Contents

	Pages
ANSI Device Function	1
Time - Current Characteristics	2
Over Current & Earth Fault Relays - MC31AnX, MC61AnX, MC61CnX	3
Trip Circuit Supervision Relay - TCS01nX	5
Current Sensing Relays - MC12A	7
Reverse Power Relay - MRP11	9
Voltage Relay - MV12	9
Motor Protection Relays - MC2 - 30M and MC2 - 30MW	11
iMMR, MPR300, MPR200nX	13
MM10	15

Correlation between ANSI/IEEE device function number and relays

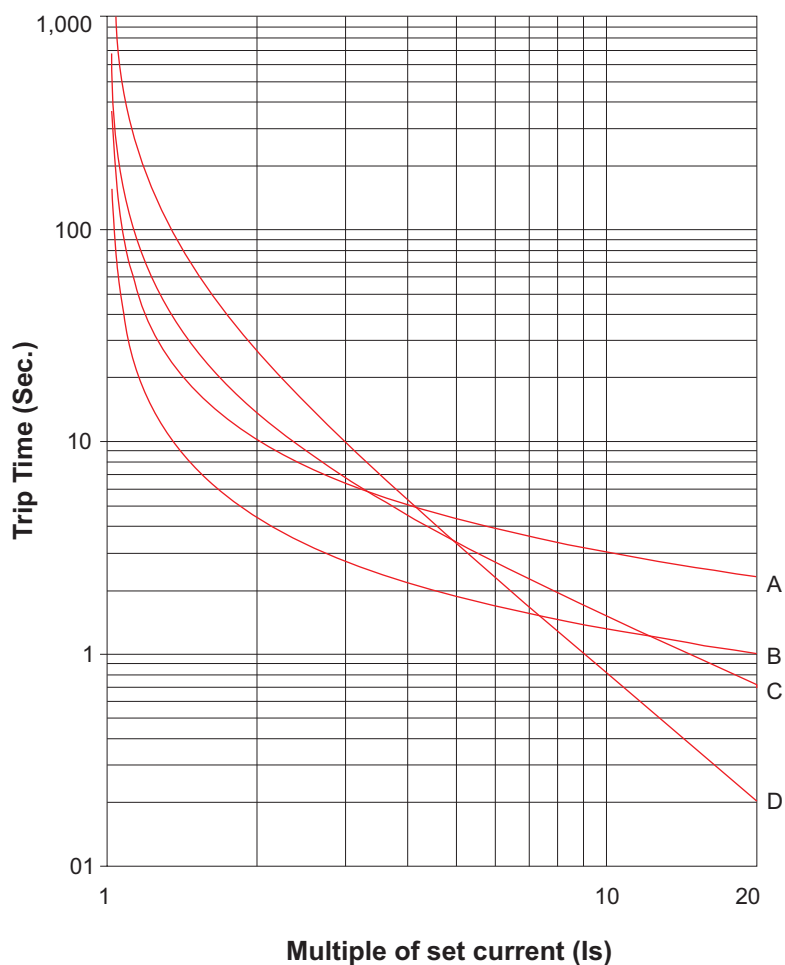
Device No.	Function Name	L&T Electrical & Automation Relays	MS Relays
21	Under impedance relay / Distance relay		MG30 / MG30-I
25	Auto synchronising		SPM21
27	AC under voltage relay	MV12 / MCOMP	UM30-A / MC1V / MC3V UFD34 / MM 30-W
27LV	Reacceleration	MCOMP	
32	Power directional relay	MRP11	MG30 / MG30-I
37	Under current or under power relay	MPR200nX / MPR300 / MCOMP	MM30 / MM30-W
40	Field control (loss of field) relay		MG30 / MG30-I
46	Reverse phase or phase balance current relay	MPR200nX / MCOMP / MPR300	MM30 / MM30-W
47	Phase-sequence or single-phasing voltage relay	MCOMP	UM30-A, MC3V / MM30-W
49	Machine or transformer thermal relay	MPR200nX / MPR300 MCOMP	MM30 / MM30-W MG30 / MG30-I
50	Instantaneous over current (or rate-of-rise) relay	MC12A / MC61AnX	MC30 / MG30 / MG30-I
50V	Voltage restrained over current relay		MG30 / MG30-I
50BF	Breaker - failure		MC30
51	AC time over current relay	MC12A / MC31AnX / MC61AnX	MC30
51N-(51G)	Ground fault time over current relay	MC12A / MC31AnX / MC61AnX	MC30
51LR	Locked rotor	MPR200nX / MPR300 / MCOMP	MM30 / MM30-W
51V	Voltage restrained for Phase Timed OC		MG30 / MG30-I
59	AC over voltage relay	MV12 / MCOMP	UFD34
59/81	Over excitation relay V/Hz		UM30-A / MG30 / MG30-I
60	Voltage balance relay		UM30-A
64	Ground detector (insulation to ground failure of machine or other apparatus)	MPR300	MG30 / MM30 / MM30-W
64S	Machine stator ground fault detector relay		MG30
66	Max. no. of starts	MCOMP	MM30 - W
81	Frequency relay	MCOMP	UM30-ASV / MG30 UFD34 / MC1V / MC3V
87	Differential protective relay		MD32G / MD32T
87N-(87G)	Ground fault differential protective relay		MD32G, MD32T
78	Vector surge protection relay		UM30-A
81R, df/dt	Rate of change of frequency		UFD34

Time - Current Characteristics

Product Design Standards

Reference standards	: IEC 60255, IEC 61000, IS3231, IS8686
Dielectric test	: IS 3231 / IEC 60255-5
Impulse test	: IS 8686 / IEC 60255- 5
HF disturbance test	: IS 8686 / IEC 60255-22-1
Electrostatic discharge test	: IEC 61000-4-2
Electrical fast transient	: IEC 61000-4-4
Radiated electro magnetic field test	: IEC 61000-4-3
Surge immunity	: IEC 61000-4-5
Ring wave test	: IEC 61000-4-12
Voltage dips & interruption test	: IEC 61000-4-11
Power frequency magnetic test	: IEC 61000-4-8

Time - Current Characteristics (At TMS = 1)



For Trip time at TMS other than 1
Trip time = (Trip time at TMS = 1) x TMS or
50 msec whichever is more.

A : Normal Inverse 3.0 sec
B : Normal Inverse 1.3 sec
C : Very Inverse
D : Extreme Inverse

Over Current and Earth Fault Relays

- Three phase over current & earth fault relays for Feeder, AC Machines and Transformer Protection in LV & MV Systems

MC31AnX – 51, 51N

MC61AnX – 51, 51N, 50, 50N

MC61CnX – 51, 51N, 50, 50N + RS485 port

Salient Features

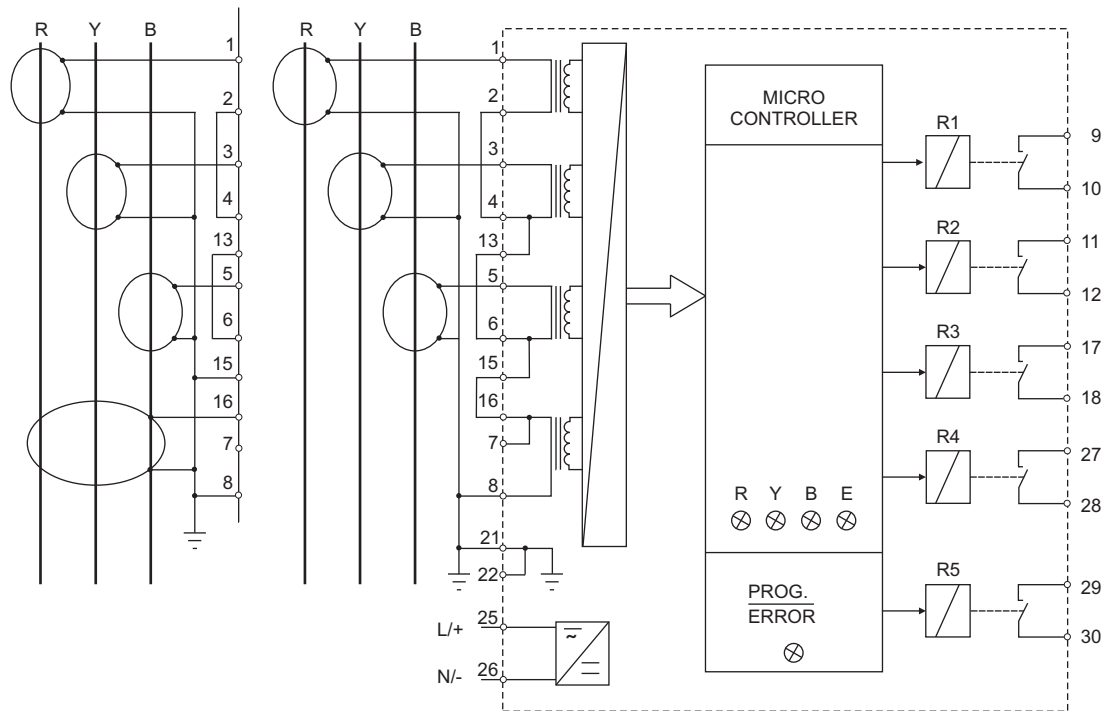
- Site selectable IEC Curves - 4 nos. of IDMT curves + 3 Definite time characteristics
- Universal Aux. supply: 24 - 240 VAC/ DC
- Large LCD Display and 4 LED's for fault indication
- Last 30 trip records with Date and Time stamping
- Built in self supervision and relay test facility
- Wide TMS Range: 0.01 – 1.60



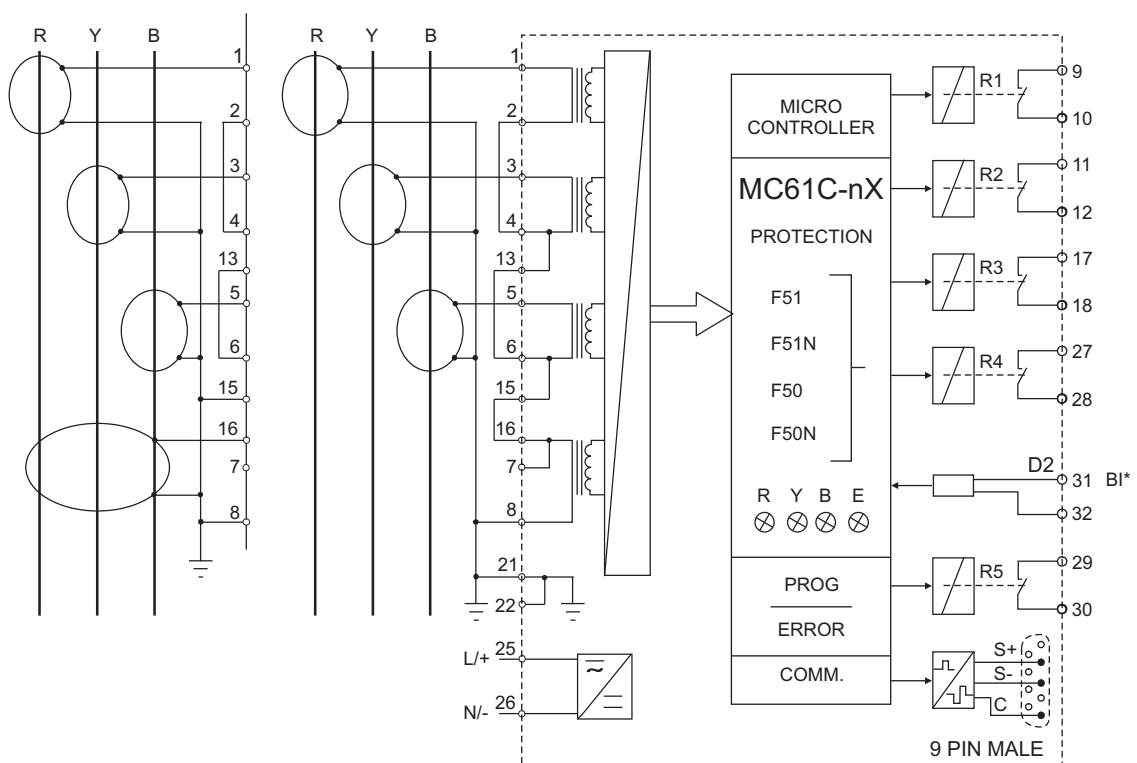
Model	MC31AnX	MC61AnX	MC61CnX
Description	3 Phase O/C + E/F	3 Phase O/C + E/F + High set	3 Phase O/C + E/F + High set + RS485 port
Device code	51, 51N	51, 51N, 50, 50N	51, 51N, 50, 50N
Function available	Lowset O/C - Is	Lowset O/C - Is	Lowset O/C - Is
	Lowset E/F - Os	Lowset E/F - Os	Lowset E/F - Os
		Highset O/C - Ihs	Highset O/C - Ihs
		Highset E/F - Ohs	Highset E/F - Ohs
Settings			Modbus on RS485
O/C Is	20 - 200% of In in step of 1%	20 - 200% of In in step of 1%	20 - 200% of In in step of 1%
E/F Os	5 - 80% of In in step of 1%	5 - 80% of In in step of 1%	5 - 80% of In in step of 1%
TMS	0.01 - 1.60 in step of 0.01	0.01 - 1.60 in step of 0.01	0.01 - 1.60 in step of 0.01
O/C High set		Disable or 0.2 to 40 of In	Disable or 0.2 to 40 of In
E/F High set		Disable or 0.05 to 20 of In	Disable or 0.05 to 20 of In
O/C & E/F High set delay		Instantaneous	Disable, 0.05, 0.1 to 2 sec in step of 0.01
Time Current Characteristics	NI1.3, NI3, VI, EI, Definite Time	NI1.3, NI3, VI, EI, Definite Time	NI1.3, NI3, VI, EI, Definite Time
Other features	Display of currents, trip count	Display of currents, trip count	Display of currents, trip count
	Self supervision feature	Self supervision feature	Self supervision feature
		Highset can be disabled	Highset can be disabled
			Breaker control
			Breaker failure protection
Output contact	Programmable 4NO or 2NO+2NC	Programmable 4NO or 2NO+2NC	Programmable 4NO
	Additional 1NO contact for IRF	Additional 1NO contact for IRF	Additional 1NO contact for IRF
Burden on CT	< 0.1VA for 1A & < 0.25VA for 5A	< 0.1VA for 1A & < 0.25VA for 5A	< 0.1VA for 1A & < 0.25VA for 5A
Burden on PT	Not Applicable	Not Applicable	Not Applicable
Operating temperature	0° to 60°C	0° to 60°C	0° to 60°C
Weight	Approx. 1.7 kg	Approx. 1.7 kg	Approx. 1.7 kg
Burden on auxiliary supply	< 3W for DC & < 10VA for AC	< 3W for DC & < 10VA for AC	< 3W for DC & < 10VA for AC
Construction	Draw out	Draw out	Draw out
Dim W x H x D in mm	121 x 164 x 224	121 x 164 x 224	121 x 164 x 224
Panel Cut out in mm	113 x 142	113 x 142	113 x 142
Ordering Information			
Auxiliary Supply	24 - 240 V AC / DC	24 - 240 V AC / DC	24 - 240 V AC / DC
CT Rating	1 A or 5 A (Site Programmable)	1 A or 5 A (Site Programmable)	1 A or 5 A (Site Programmable)
Output Contacts	4 NO or 2 NO + 2 NC	4 NO or 2 NO + 2 NC	4 NO

Wiring Diagrams

MC31AnX / MC61AnX



MC61CnX



* BLOCKING INPUT

Trip Circuit Supervision Relay

- TCS01-nX is an electronic relay, designed to monitor the healthiness of trip coil circuit of a circuit breaker

Salient Features

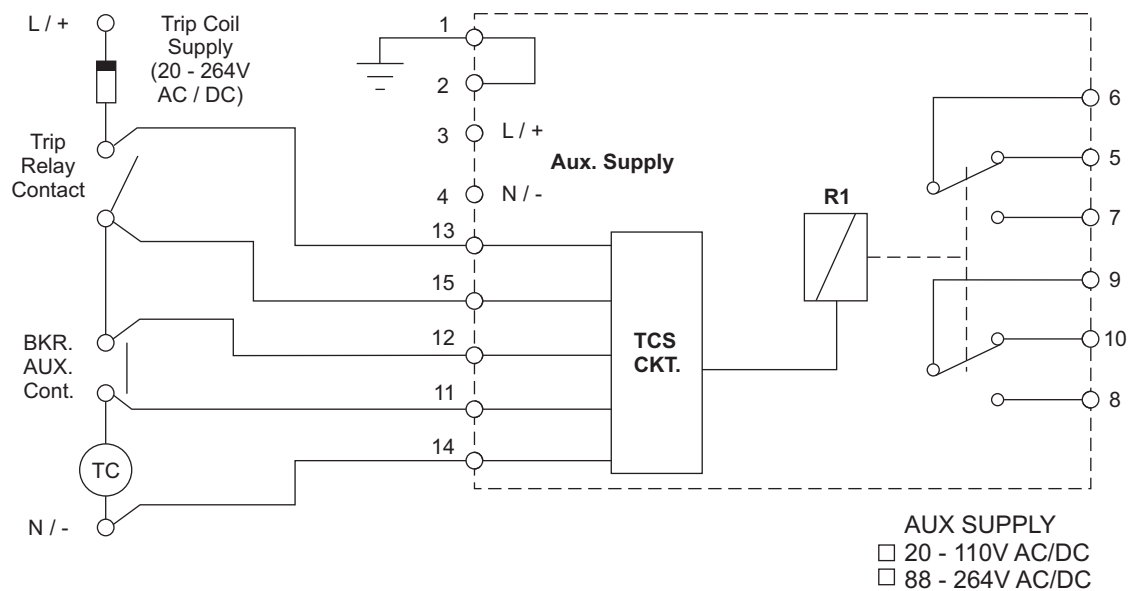
- It monitors the trip coil circuit continuously in breaker ON as well as breaker OFF conditions and gives alarm in case of following faults:
 - Open Circuit of trip coil or trip coil circuit
 - Failure of trip coil supply
 - Under voltage condition of trip coil supply
 - Failure of auxiliary supply
 - Failure of circuit breaker mechanism to complete trip operation
- TCS01-nX will work for any Trip coil supply between 20V to 264V AC/DC. It can be set to monitor standard voltages i.e., 24, 48, 110, 220V DC and 110, 240V AC
- Enable/Disable facility for Trip coil supply monitoring
- Relay testing facility
- Flush mounting with draw-out case design



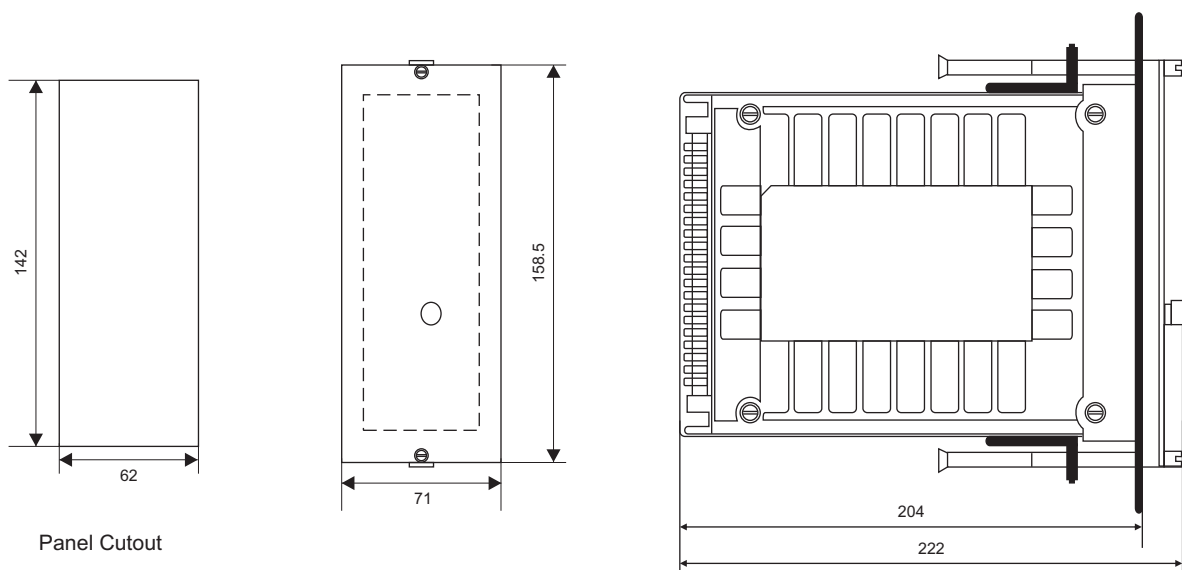
Model		TCS01NX
Description		Trip Circuit Supervision Relay
Device code		74
Design		static
Settings	Trip coil supply	24, 48, 110, 220V DC & 110, 240V AC
Trip time	Trip time delay	600 msec $\pm$ 100 msec
	Trip time delay in low	< 3 sec
	TC voltage condition	
Reset Time		< 150 msec
Burden on CT		Not applicable
Burden on PT		Not applicable
Operating temp		-10°C to 55°C
weight		Around 1 kg
Output contacts		2 C/O contacts (self reset)
Output contact Rating		8 A, (250 VAC / 30 VDC)
Construction		Draw-out
Dim (W x H x D) in mm		71 x 158 x 204
Panel cutout (WxH) in mm		62 x 142
Ordering information		
Auxiliary supply	Type 1	20-110 VAC/ DC
	Type 2	88-264 VAC/ DC

Wiring Diagrams

TCS01NX



Dimensions



All Dimensions (mm)

Current Sensing Relays

- Single phase over current / earth fault relay - MC12

Salient Features

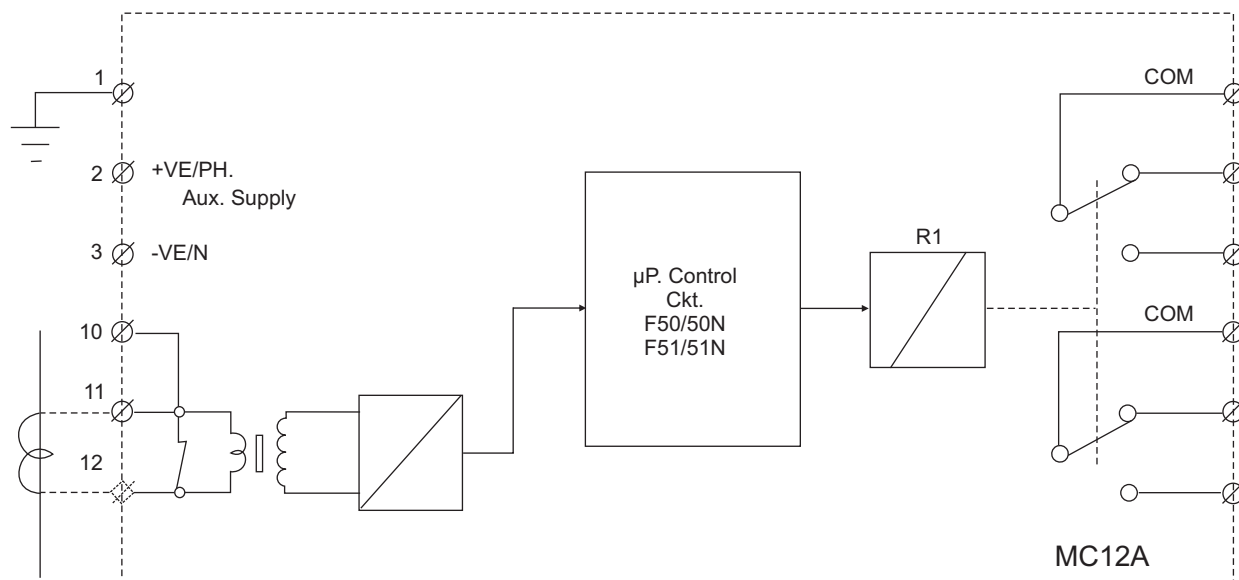
- Easy setting through front panel DIP switches
- Indication for power ON and trip status
- Test feature - helps in better maintenance
- Compact, light weight helps in reducing panel size & thickness



Model		MC12A
Description		1 Ph O/C or E/F
Device code		50/51 or 50N/51N
Design		Microcontroller based
Functions available		Lowset O/C - Is
		Highset O/C - Ihs
		Lowset E/F - Os
		Highset E/F - Is
Settings		O/C Is = 50 - 200% Step 10% or
		E/F Is = 10 - 40% Step 2% or
		E/F Is = 20 - 80% Step 4%
		HS O/C = (2 - 16) xls step 2 Is
		HS E/F = (2 - 16) xls step 2 Is
		Time characteristics available -
		NI, VI, EI, Definite time
		3 ranges of def time (1, 10, 100)
Other features		TMS : 0.1 - 1.6 Step 0.1
		Site selectable trip time char.
Burden on CT		Highset can be disabled
Burden on PT		≤ 0.25 VA on CT
Operating temp		Not applicable
Weight		0°C - 60°C
Burden on auxiliary supply		< 1.5kg
Output contacts		≤ 5.5 VA
Construction		2 C/O Contacts (S/R)
Dim W x H x D in mm		Drawout
Panel cutout		71 x 158 x 224
Ordering Information		
Auxiliary supply	Type 1	62 x 142
	Type 2	20 - 110 V AC / DC or
CT Rating		88 - 264 V AC / DC
Range setting		1 A or 5 A
		10 - 40% or 20 - 80% or 50 - 200%
		Site selectable

Wiring Diagrams

MC12A



In
☐ 1A
☐ 5A

AUX SUPPLY
☐ 24 - 110V AC/DC
☐ 95 - 240V AC/DC

SETTING RANGE (Is)

MC12A
 (10-40)% In
 (20-80)% In
 (50-200)% In

Reverse Power Relay, Under Voltage or Over Voltage Relay

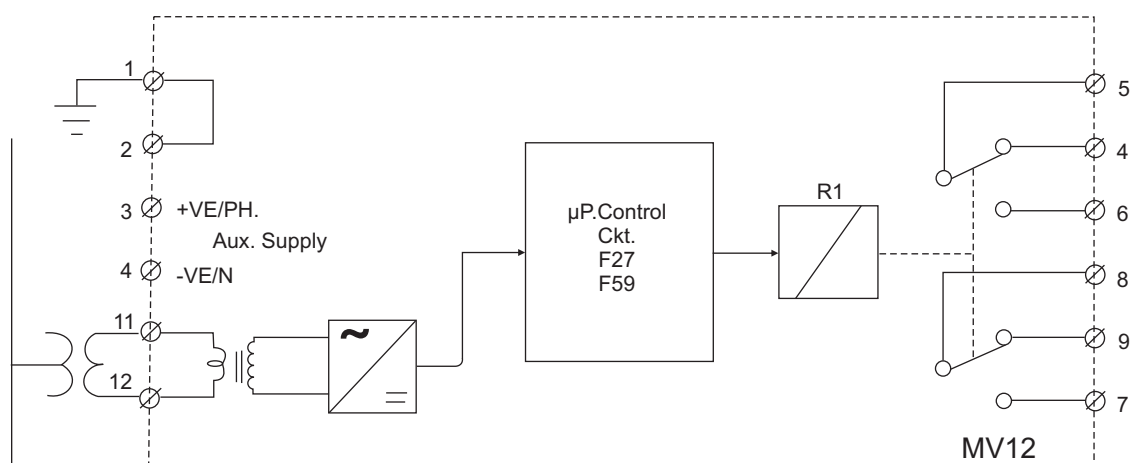
Salient Features

- Easy setting through front panel DIP switches
- LED indication for power ON and trip status
- Test feature - helps in better maintenance
- Compact, light weight helps in reducing panel size & thickness



Model	MRP11	MV12
Description	Reverse power	1 Ph U/V or O/V
Device code	32	27 or 59
Design	Microcontroller based	Microcontroller based
Functions available	Reverse power level	Lowset U/V - Vs
		Lowset O/V - Vs
Settings	PT input Vn 110 V, 415 V AC	U/V Vs = 95-20% step 5%
	CT input In 1 A / 5 A	O/V Vs = 105-180% step 5%
	Pick up level 1% - 15%	Time characteristics available-
	Min. setting 0.5%	Inverse time, definite time
	TMS 0 to 1.5 step 0.1	TMS : 0.1 - 1.6 Step 0.1
	Definite time characteristics	
Other features	LED indication	Site selectable U/V or O/V
	Test feature	Site selectable trip time char.
Burden on PT	< 0.25 VA	< 0.25 VA
Burden on CT	< 0.05 VA	0.075 VA on PT
Operating temp	0°C to 60°C	0°C to 60°C
Weight	< 1.5kg	< 1.5kg
Burden on auxiliary supply	< 8 VA	8 VA
Output contacts	1 N/O + 1 C/O	2 C/O Contacts (S/R)
Construction	Drawout	Drawout
Dim W x H x D in mm	71 x 158 x 224	71 x 158 x 224
Panel cutout	62 x 142	62 x 142
Ordering Information		
Auxiliary supply	Type 1	20 - 110 V AC / DC
	Type 2	88 - 264 V AC / DC
CT Rating	1 A or 5 A	Not applicable
PT Rating	Upto 380 V AC	110 V / 240 V / 415 V (site selectable)

MRP11





MC2-30M Motor Protection Relay

General Characteristics

MC2 is the new generation of Microelettrica Scientifica's entry level protection relays.

Complete motor protection relay designed for the protection and active security of medium and large size induction motor.

The relay also computes the positive and negative sequence components of system.

The earth current input circuit includes a 3 harmonic active filter.

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

Protective Functions

- F37 : No-Load Running
- F46 : Current Unbalance
- F47 : Phase sequence or phase-balance voltage (Negative sequence)
- F48 : Starting Control
- F49 : Thermal Image F50/51: Overcurrent
- F51LR: Locked Rotor
- F64 : Earth Fault
- F66 : Control of n° of starting
- F74 : Trip circuit supervision
 - : Breaker failure protection
 - : Reduced Voltage Starting Control

Measurements

- RealTime Measurements (IA - IB - IC - Io)
- Maximum Demand and Inrush Recording (IA - IB - IC - Io)
- Trip Recording

Control

- Two complete setting programs switchable locally or remotely
- Time tagged multiple event recording and journal (500 events)
- Oscillographic wave form capture up to 40 sec.
- Complete autodiagnostic program
- Blocking Outputs and Blockings Inputs for pilot wire
- file system - Mass storage device
- Oscillo available also in comtrade format

Technical Characteristics

- 8 Programmable Output Relays
- 8 Programmable Digital Inputs
- Hi-resolution graphic display (240*128)
- 10 Programmable Leds
- 6 Programmable push button

Communications

- RS485 Serial communication port on rear side
- USB communication port on front panel
- Modbus RTU / IEC870-5-103 Communication protocol

Software

- MCom2 Program interface for device management

Power Supply Ratings

- 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.

Execution

- Plastic Enclosure
- IP44 degree of protection

MC2-30M

Programmable Input Quantities

F_n = System frequency	: (50 ÷ 60) Hz	
I_n = Rated primary current of phase CTs	: (0 ÷ 9999)A	step 1A
O_n = Rated primary current of earth fault detection CT	: (0 ÷ 9999)A	step 1A

F49 : Thermal Image

Function enabling	: No - Yes	
Operation Mode	: I1.I2 / I _{max}	
Temperature prealarm	: $T_{al} = (10 \div 100)\%T_n$	step 1%
Temperature reset	: $T_{res} = (10 \div 100)\%T_n$	step 1%
Continuous admissible current	: $I_s = (0.5 \div 1.5)I_n$	step 0.01I _n
Warming-up time constant of the load	: $T_o = (1 \div 10)$	step 1

F50/51 (1I>): 1st Overcurrent Element

Function enabling	: No - Yes	
Time current curves	: $f(t)$ = Indep.Definite Time (D), IEC (A/B/C),IEEE (MI/VI/II/EI/SI)	
Operation level	: $I_s = (0.1 \div 4)I_n$	step 0.01I _n
Independent time delay	: $t_s = (0.02 \div 100)s$	step 0.01s

F50/51 (2I>): 2nd Overcurrent Element

Function enabling	: No - Yes	
Automatic doubling of trip level on inrush	: Enable / Disable	
Operation level	: $I_s = (0.1 \div 40)I_n$	step 0.01I _n
Independent time delay	: $t_s = (0.02 \div 100)s$	step 0.01s

F50/51 (3I>): 3rd Overcurrent Element

Function enabling	: No - Yes	
Automatic doubling of trip level on inrush	: Enable / Disable	
Operation level	: $I_s = (0.1 \div 40)I_n$	step 0.01I _n
Independent time delay	: $t_s = (0.02 \div 100)s$	step 0.01s

F64 (1Io>): 1st Earth Fault Element

Function enabling	: No - Yes	
Time current curves	: $f(t)$ = Indep.Definite Time (D), IEC (A/B/C),IEEE (MI/VI/II/EI/SI)	
Operation level	: $I_s = (0.01 \div 4)O_n$	step 0.01O _n
Independent time delay	: $t_s = (0.02 \div 100)s$	step 0.01s

F64 (2Io>): 2nd Earth Fault Element

Function enabling	: No - Yes	
Operation level	: $I_s = (0.01 \div 9.99)O_n$	step 0.01O _n
Independent time delay	: $t_s = (0.02 \div 100)s$	step 0.01s

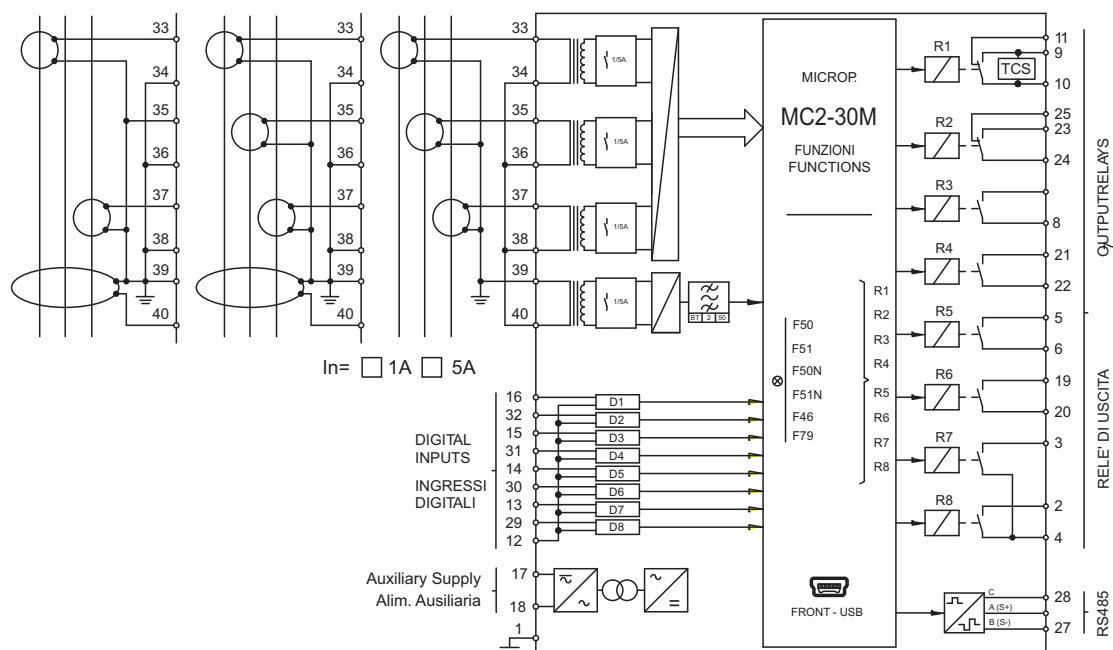
F64 (3Io>): 3rd Earth Fault Element

Function enabling	: No - Yes	
Operation level	: $I_s = (0.01 \div 9.99)O_n$	step 0.01O _n
Independent time delay	: $t_s = (0.02 \div 100)s$	step 0.01s

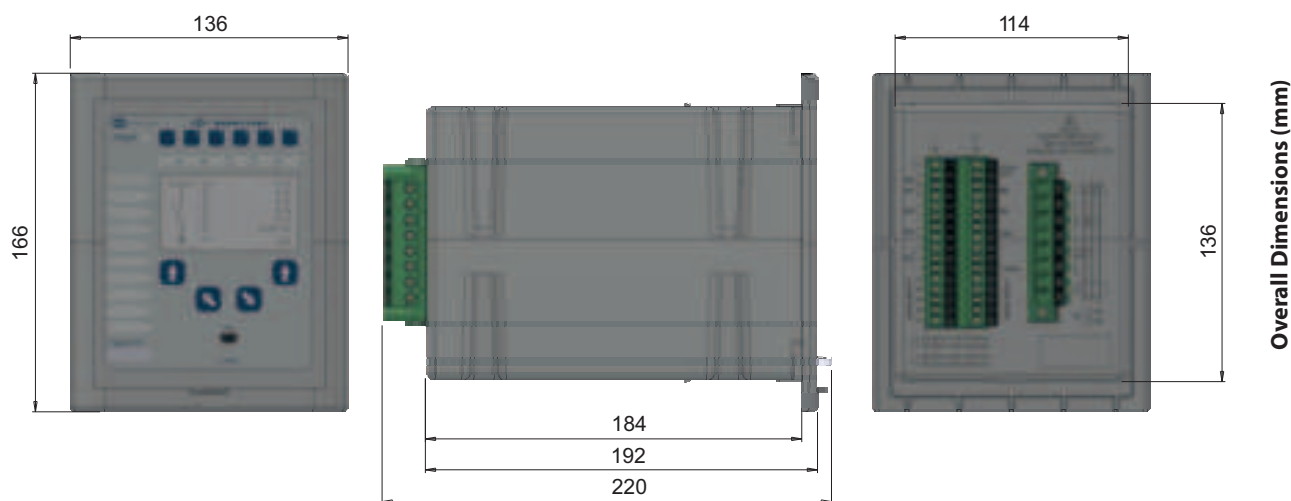
MC2-30M

F46 (1Is>): 1st Current Unbalance Element		
Function enabling	: No - Yes	
Time current curves	: f(t) = Indep.Definite Time (D), IEC (A/B/C),IEEE (MI/VI/II/EI/SI)	
Operation level	: Is = (0.1 ÷ 4)In	step 0.01In
Independent time delay	: ts = (0.02 ÷ 100)s	step 0.01s
F46 (2Is>): 2nd Current Unbalance Element		
Function enabling	: No - Yes	
Operation level	: Is = (0.1 ÷ 4)In	step 0.01In
Independent time delay	: ts = (0.02 ÷ 100)s	step 0.01s
F51LR - (LR) Locked Rotor		
Function enabling	: No - Yes	
Setting range	: ILR = (1 ÷ 5)In	step 0.1In
Trip time delay	: tLR = (1 ÷ 120)s	step 1s
F66 (StNo) - Limitation of N° of Startings		
Function enabling	: No - Yes	
Numbers of starting	: StNo = (1 ÷ 60)	step 1
Time interval for counting of StNo	: tstNo = (60 ÷ 3600)s	step 1s
Reset time after trip	: tBst = (60 ÷ 3600)s	step 1s
F37 - (I<) No-Load Running		
Function enabling	: No - Yes	
Setting Range	: I< = (0.15 ÷ 1)In	step 0.01In
Trip time delay	: tI< = (0.1 ÷ 90)s	step 0.01s
StSeq - Starting Sequence Control		
Function enabling	: No - Yes	
Setting Range	: ITr = (0.1 ÷ 1)In	step 0.1In
Trip time delay	: tTr = (0.5 ÷ 50)s	step 0.1s
Motor Starts		
Setting Range (Min. level for motor ON)	: Is = (0.05 ÷ 1)In	step 0.01In
Motor start filter time	: tfSt = (0.02 ÷ 1)s	step 0.01s
Motor Starting time	: tSt = (10 ÷ 120)s	step 0.01s
Breaker Failure Element		
Alarm time delay	: tBF= (0.05 ÷ 0.75)s	step 0.01s
Trip Circuit Supervision Element		
Function enabling	: No - Yes	
Independent time delay	: ts = (0.1 ÷ 100)s	step 0.01s
Trip circuit voltage	: = (24 ÷ 250)Vdc	

Connection Diagram



Overall Dimensions (mm)



Typical Characteristics	
Accuracy at reference value of influencing factors	2% I_n - 0.2% On for measurements
	2% + (to = 20 ÷ 30ms @ 2xIs) for times
Rated Current	$I_n = 1A/5A$ - On = 1A/5A
Current Overload	500 A for 1 sec; 20 A continuous
Burden on current input	0.1 VA at $I_n = 1A$; 0.3 VA at $I_n = 5A$
Average power supply consumption	7VA
Output relays	rating 6 A; $V_n = 250V$ A.C. resistive switching = 1500W (400V max)
	make = 30 A (peak) 0.5 sec.,
	break = 0.3 A, 110 Vcc, L/R = 40 ms (100.000 op.)

Order Code - Example :	1	2	1
MC2-30M	Power Supply	Phase Rated Input Current	Zero sequence Input Current
	1 = Type 1	1 = 1A	1 = 1A
	2 = Type 2	2 = 5A	2 = 5A

Motor Protection Relay



MC2-30MW

MOTOR PROTECTION RELAY with VOLTAGE & POWER CONTROL

MC2 is the new generation of Microelettrica Scientifica's entry level protection relays.

Complete motor protection relay designed for the protection and active security of medium and large size induction motor.

The relay also computes the positive and negative sequence components of system.

The earth current input circuit includes a 3rd harmonic active filter.

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

Protective Functions

- F27/59 : Over/Under Voltage
- F37 : No-Load Running
- F47 : Phase sequence or phase-balance voltage (Negative sequence)
- F48 : Starting Control
- F49 : Thermal Image
- F50/51 : Overcurrent
- F51LR : Locked Rotor
- F55 : Low Power Factor
- F64 : Earth Fault
- F66 : Control of n° of starting
- F74 : Trip circuit supervision
- F81 : Over/Under Frequency
- : Breaker failure protection
- : Reduced Voltage Starting Control

Measurements

- Real Time Measurements (IA - IB - IC - Io)
- Maximum Demand and Inrush Recording (IA - IB - IC - Io)
- Trip Recording (30 last trip)

Control

- Two complete setting programs switchable locally or remotely
- Time tagged multiple event recording and journal (500 events)
- Oscillographic wave form capture up to 40 sec.
- Complete autodiagnostic program
- Blocking Outputs and Blockings Inputs for pilot wire
- file system - Mass storage device
- Oscillo available also in comtrade format

Technical Characteristics

- 8 Programmable Output Relays
- 8 Programmable Digital Inputs
- Hi-resolution graphic display (240*128)
- 10 Programmable Leds
- 6 Programmable push button

Communications

- Rs485 Serial communication port on rear side
- USB communication port on front panel
- Modbus RTU / IEC870-5-103 Communication protocol

Software

- MCom2 Program interface for device management

Power Supply Ratings

- 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.

Execution

- Plastic Enclosure
- IP44 degree of protection

MC2-30MW

Programmable Input Quantities

Fn = System frequency	: (50 ÷ 60) Hz	
In = Rated primary current of phase Cts	: (0 ÷ 9999)A	step 1A
On = Rated primary current of earth fault detection CT	: (0 ÷ 9999)A	step 1A

F49 : Thermal Image

Function enabling	: No - Yes	
Operation Mode	: I1.I2 / Imax	
Temperature prealarm	: Tal = (10 ÷ 100)%Tn	step 1%
Temperature reset	: Tres = (10 ÷ 100)%Tn	step 1%
Continuous admissible current	: Is = (0.5 ÷ 1.5)In	step 0.01In
Warming-up time constant of the load	: To = (1 ÷ 10)	step 1

F50/51 (1I>): 1st Overcurrent Element

Function enabling	: No - Yes	
Time current curves	: f(t) = Indep.Definite Time (D), IEC (A/B/C),IEEE (MI/VI//EI/SI)	
Operation level	: Is = (0.1 ÷ 4)In	step 0.01In
Independent time delay	: ts = (0.02 ÷ 100)s	step 0.01s

F50/51 (2I>): 2nd Overcurrent Element

Function enabling	: No - Yes	
Automatic doubling of trip level on inrush	: Enable / Disable	
Operation level	: Is = (0.1 ÷ 40)In	step 0.01In
Independent time delay	: ts = (0.02 ÷ 100)s	step 0.01s

F50/51 (3I>): 3rd Overcurrent Element

Function enabling	: No - Yes	
Automatic doubling of trip level on inrush	: Enable / Disable	
Operation level	: Is = (0.1 ÷ 40)In	step 0.01In
Independent time delay	: ts = (0.02 ÷ 100)s	step 0.01s

F64 (1Io>): 1st Earth Fault Element

Function enabling	: No - Yes	
Time current curves	: f(t) = Indep.Definite Time (D), IEC (A/B/C),IEEE (MI/VI//EI/SI)	
Operation level	: Is = (0.01 ÷ 4)On	step 0.01On
Independent time delay	: ts = (0.02 ÷ 100)s	step 0.01s

F64 (2Io>): 2nd Earth Fault Element

Function enabling	: No - Yes	
Operation level	: Is = (0.01 ÷ 9.99)On	step 0.01On
Independent time delay	: ts = (0.02 ÷ 100)s	step 0.01s

F64 (3Io>): 3rd Earth Fault Element

Function enabling	: No - Yes	step 0.01On
Operation level	: Is = (0.01 ÷ 9.99)On	step 0.01s
Independent time delay	: ts = (0.02 ÷ 100)s	

F46 (1Is>): 1st Current Unbalance Element

Function enabling	: No - Yes	
Time current curves	: f(t) = Indep.Definite Time (D), IEC (A/B/C),IEEE (MI/VI//EI/SI)	
Operation level	: Is = (0.1 ÷ 4)In	step 0.01In
Independent time delay	: ts = (0.02 ÷ 100)s	step 0.01s

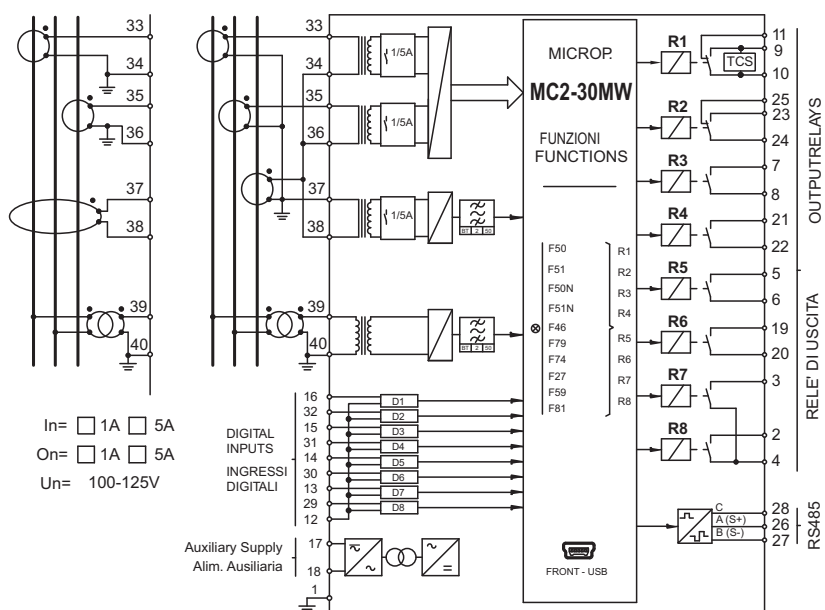
F46 (2Is>): 2nd Current Unbalance Element

Function enabling	: No - Yes	
Operation level	: Is = (0.1 ÷ 4)In	step 0.01In
Independent time delay	: ts = (0.02 ÷ 100)s	step 0.01s

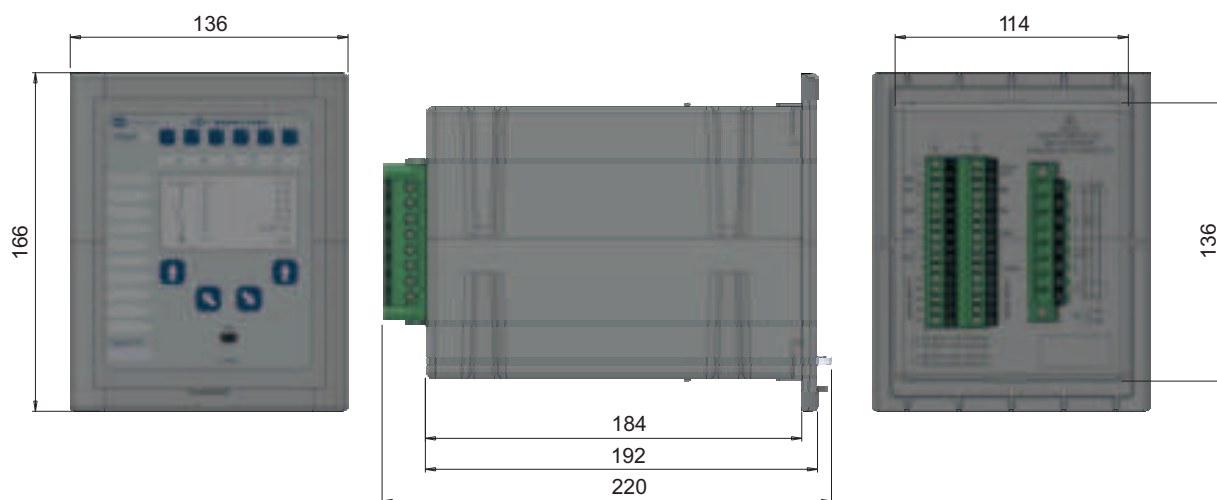
MC2-30MW

F27 : Undervoltage Element		
Function enabling	: No - Yes	
Undervoltage level	: $U_s = (0.3 \div 1)U_n$	step 0.01Un
Time delay of under voltage level	: $t_s = (0.1 \div 99.9)s$	step 0.1s
F59 : Overvoltage Element		
Function enabling	: No - Yes	step 0.01Un
Overvoltage level	: $U_s = (0.7 \div 1.4)U_n$	step 0.1s
Time delay	: $t_s = (0.1 \div 99.9)s$	
F81< : Underfrequency Element		
Function enabling	: No - Yes	step 0.01Hz
Underfrequency level	: $f_s = (0 \div 9.99)Hz$	step 0.1s
Time delay	: $t_s = (0.1 \div 99.9)s$	
F81> : Overfrequency Element		
Function enabling	: No - Yes	
Overfrequency level	: $f_s = (0 \div 9.99)Hz$	step 0.01Hz
Time delay	: $t_s = (0.1 \div 99.9)s$	step 0.1s
F55 : Low Power Factor Element		
Function enabling	: No - Yes	
Low power factor level	: $PF_s = (0.5 \div 0.98)$	
Time delay	: $t_s = (1 \div 999)s$	step 1s
F51LR - (LR) Locked Rotor		
Function enabling	: No - Yes	
Setting range	: $ILR = (1 \div 5)I_n$	step 0.1In
Trip time delay	: $tLR = (1 \div 120)s$	step 1s
F66 (StNo) - Limitation of N° of Startings		
Function enabling	: No - Yes	
Numbers of starting	: $StNo = (1 \div 60)$	step 1
Time interval for counting of StNo	: $tstNo = (60 \div 3600)s$	step 1s
Reset time after trip	: $tBst = (60 \div 3600)s$	step 1s
F37 - (I<) No-Load Running		
Function enabling	: No - Yes	
Setting Range	: $I< = (0.15 \div 1)I_n$	step 0.01In
Trip time delay	: $tI< = (0.1 \div 90)s$	step 0.01s
StSeq - Starting Sequence Control		
Function enabling	: No - Yes	step 0.1In
Setting Range	: $ITr = (0.1 \div 1)I_n$	step 0.1s
Trip time delay	: $tTr = (0.5 \div 50)s$	
Motor Starts		
Setting Range (Min. level for motor ON)	: $I_s = (0.05 \div 1)I_n$	step 0.01In
Motor start filter time	: $tfSt = (0.02 \div 1)s$	step 0.01s
Motor Starting time	: $tSt = (10 \div 120)s$	step 0.01s
Breaker Failure Element		
Alarm time delay	: $tBF = (0.05 \div 0.75)s$	step 0.01s
Trip Circuit Supervision Element		
Function enabling	: No - Yes	
Independent time delay	: $t_s = (0.1 \div 100)s$	step 0.01s

Connection Diagram



Overall Dimensions (mm)



Typical Characteristics	
Accuracy at reference value of influencing factors	2% In - 0.2% On for measurements
	2% + (to = 20 + 30ms @ 2xIs) for times
Rated Current	In = 1A/5A - On = 1A/5A
Current Overload	500 A for 1 sec; 20 A continuous
Burden on current input	0.1 VA at In = 1A; 0.3 VA at In = 5A
Average power supply consumption	≤ 7VA
Output relays	rating 6 A; Vn = 250V A.C. resistive switching = 1500W (400V max)
	make = 30 A (peak) 0.5 sec.,
	break = 0.3 A, 110 Vcc, L/R = 40 ms (100.000 op.)

Order Code - Example :	1	2	1
MC2-30M	Power Supply	Phase Rated Input Current	Zero sequence Input Current
	1 = Type 1	1 = 1A	1 = 1A
	2 = Type 2	2 = 5A	2 = 5A

iMMR

iMMR is an Intelligent Motor Control Centre (IMCC) Relay. It has been designed as a reliable building block for low voltage, contactor - controlled motor starter feeders in switchgear assemblies. The new iMMR series offers comprehensive Motor Protection along with Control and Monitoring features.



iMMR Main Unit -

- An extremely compact motor protection relay with control and monitoring functions.
- 4 DI + 3 DO available to take care of DOL, Star-Delta and RDOL starters
- 4 LED's for easy troubleshooting and a RESET button is available on main unit.
- Inbuilt Modbus RTU protocol.

Display Unit -

- An self-powered display module provides easy interface for monitoring and configuration of iMMR
- The display unit is a detachable optional unit provided with iMMR for display of all metering, protection and fault data.
- 5 LED's and START/ STOP/ RESET buttons are available on Display unit.

CT/CTVT Unit -

- iMMR comes with its own current module and current + Voltage module in two sizes and suitable for use from 0.3 Amp to 25 Amp

User Friendly Options & Features

Highly scalable IO - 4 digital input and 3 changeover digital outputs are available in base unit.

Universal Operating environment - Auxiliary supply range of 80 – 240 VAC/VDC

Metering - Includes line, neutral & average current, line voltage & phase voltages, Power, Energy, Power Factor, Temperature and Thermal Capacity

Monitoring – 100 events & 20 trip data recording with date & time stamping. Recording of No. of start, Stop, Starting Curve, starting time is also available.

Communication - iMMR can be connected to Plant Control System (SCADA/DCS) through Modbus RTU communication protocol

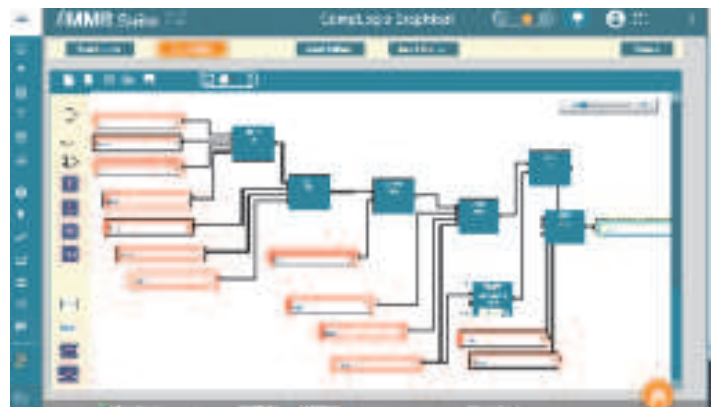
Temperature Monitoring - Unit takes input from RTD or PTC.

iMMR Suite - This software for local parameterization and monitoring of iMMR Relay. Users can create, save, read, and write the settings.

iMMR Suite



Graphical Logic



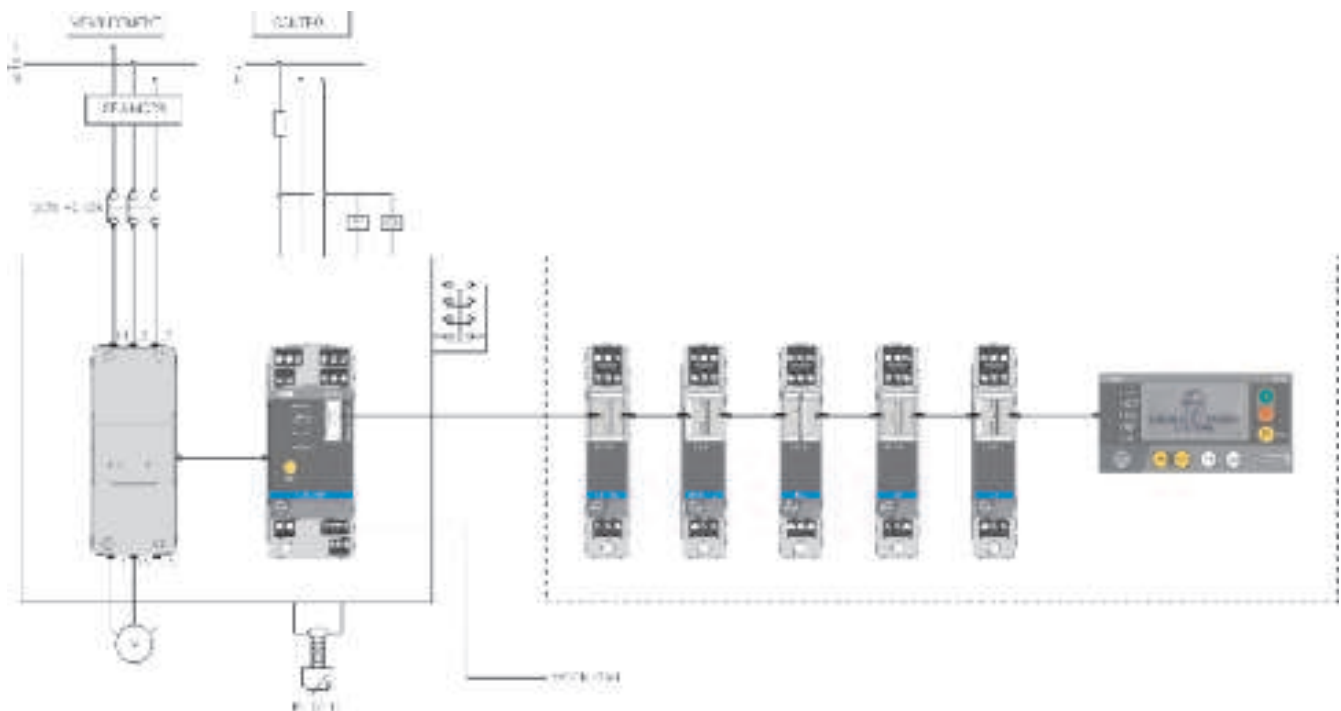
Setting Range Chart for Protections

Protection Function	Variable	Range
Thermal Overload	Alarm	80-100% of TM
	Thermal reset level	30-95% of TM
	Cool down time	0.0 – 6000.0 Sec
Under Current	Pick up	15 - 100% Iflc
	Alarm	100-115%
	Trip Delay	0.100 –6000 Sec
NI Over Current	Pick up	20 - 1000%Iflc
	Alarm	25-100 % of Pick up
	Trip Delay	0.100 - 200 Sec
Stalled Rotor	Pick up	50 - 1000% Iflc
	Alarm	25-100 % of Pick up
	Trip Delay	0.100 – 6000.0 Sec
DT Over current	Pick up	50 - 1000% Iflc
	Alarm	25-100 % of Pick up
	Time During Start	0.100 – 6000.0 Sec
	Time During Run	0.100 – 6000.0 Sec
Locked Rotor	Pick up	150 - 1000% Iflc
	Alarm	25-100 % of Pickup
	Trip Delay	0.100 - 6000.0 Sec
Short Circuit	Pick up	100 - 1000% Iflc
	Alarm	25 - 100% of Pick up
	Trip Delay	0.050 - 10 Sec
Current Phase Loss	Time Delay	0.100 – 6000.0 Sec
Earth Fault (Internal) Or External)	Pick up	10 - 500% Iflc
	Alarm	25-100 % of Pick up
	Trip Delay	0.5 - 10 Sec
	Pick up	0.030 - 40A
	Alarm	25-100%
	Trip Delay	0.100 - 6000 Sec
Under Volatge	Pick up	25 - 100% Vn
	Alarm	110% of Pick up
	Trip Delay	0.100-6000 Sec
Over Volatge	Pick up	101 - 130% Vn
	Alarm	25-100 %
	Trip Delay	0.1000-6000 Sec
Current Phase Reversal	Time Delay	0.100 – 6000.0 Sec
Voltage phase unbalance	Pick up	5-50%
	Alarm	Equal to Pickup level
	Trip Delay	0.100 – 6000.0
Voltage phase reversal	Time Delay	0.100 – 6000.0 Seconds
Voltage phase loss	Time Delay	0.100 – 6000.0 Sec
Over Frequency	Pick up	100-110%
	Alarm	99% of Pickup
	Trip Delay	0.100 – 6000.0 Sec
Under Frequency	Pick up	90-100%
	Alarm	101% of Pickup
	Trip Delay	0.100 – 6000.0 Sec
Over Power	Pick up	20-1000% of Pn
	Alarm	20-1000% of Pn
	Trip Delay	0.100 – 6000.0 Sec
Under Power	Pick up	20-1000% of Pn
	Alarm	20-1000% of Pn
	Trip Delay	0.100 – 6000.0 Sec
Over PF	Pick up	0.4 – 1.00
	Alarm	0.4 – 1.00
	Trip Delay	0.100 – 6000.0 Sec

Metering Specifications

Monitoring	Specifications
Event & Trip Records	Stores last 20 trip records with the date and time stamp
	Stores last 100 Event records with the date and time stamp
Hour Meter	Records and Stores last operational stops and total operational hours
Start, Stop, Trip Counter	Records and stores number of starts, stops and trip of the motor
Starting Curve	Records and stores starting characteristics of motor
Starting Time	Records and stores the Start time of the motor
Starting Peak current	Record the peak current during starting of the motor
DI/DO Status	Displays real time status (high or low) of digital input and output of the relay

Typical Wiring Diagram –



Advanced Features

Control Functions / Starters:

- Re-acceleration
- Maximum number of starts
- Anti-back spin timer
- Starters:
 - Overload Relay
 - DOL
 - RDOL
 - Start Delta Starter

Logic Functions:

- Truth tables
- Timers, Counters
- Volatile / Non-volatile signal conditioners
- Flashing / Flickering

Communication:

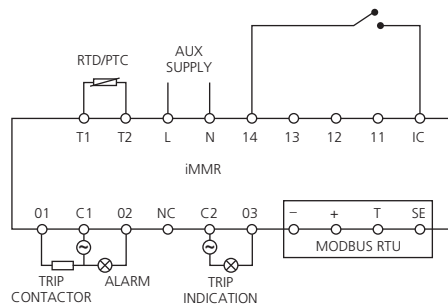
- Modbus RTU:
 - RS 485 Interface
 - 4800 - 115200 bps baud rate
 - Registers - Read / write coil, Holding registers Read Input, discrete input registers

Product Specifications

Current Measurement	
Range	Type 1 : 0.3 - 3A AC Type 2 : 2.5 - 25A AC
Accuracy	+/- 1% in nominal range
Voltage Measurement	
Range	60 - 690V AC
Accuracy	+/- 1% in nominal range
Frequency Measurement	
Range	45Hz - 65Hz
Accuracy	+/- 1% in nominal range
Power Measurement	
Active Power Accuracy	+/- 2% in nominal range
Power Factor Range	0.4 - 1.0
Power factor Accuracy	+/- 0.03

Standard Schematic

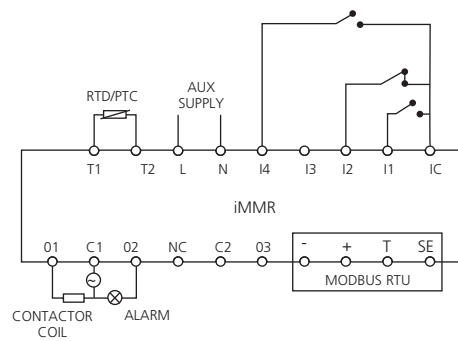
OVERLOAD



DI/DO	TERMINAL NO.	FUNCTION/SOURCE	ACT. TYPE	APPLICATION
DI1	O-C1	TRIP	ACT. LOW	CONTACTOR CONTROL
DI2	O2-C1	ALARM	ACT. HIGH	ALARM INDICATION
DI4	IC-14	TRIP RESET	ACT. HIGH	TRIP RESET
DO3	O3-C2	TRIP	ACT. HIGH	TRIP INDICATION

Note: DI - Potential Free Signal
DO - Potential Free Contact

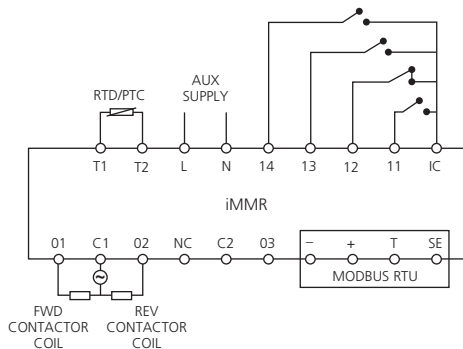
DOL



DI/DO	TERMINAL NO.	FUNCTION/SOURCE	ACT. TYPE	APPLICATION
DI1	IC-11	LSTRT>	ACT. HIGH	LOCAL START
DI2	IC-12	LSTOP	ACT. LOW	LOCAL STOP
DI4	IC-14	TRIP RESET	ACT. HIGH	TRIP RESET
DO1	O1-C1	CONTACTOR O/P1	ACT. HIGH	CONTACTOR COIL
DO2	O2-C1	ALARM	ACT. HIGH	ALARM INDICATION

Note: DI - Potential Free Signal
DO - Potential Free Contact

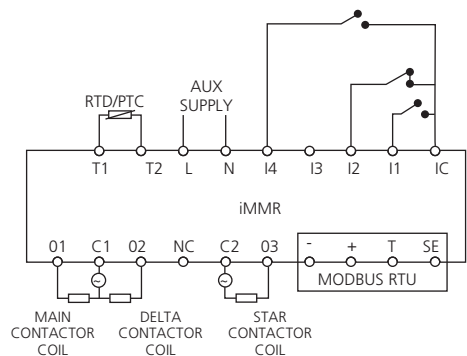
RDOL



DI/DO	TERMINAL NO.	FUNCTION/SOURCE	ACT. TYPE	APPLICATION
DI1	IC-11	LSTRT>	ACT. HIGH	LOCAL START FWD
DI2	IC-12	LSTOP	ACT. LOW	LOCAL STOP
DI3	IC-13	LSTRT<	ACT. HIGH	LOCAL START REV
DI4	IC-14	TRIP RESET	ACT. HIGH	TRIP RESET
DO1	O1-C1	CONTACTOR O/P1	ACT. HIGH	FW CONTACTOR COIL
DO2	O2-C1	CONTACTOR O/P2	ACT. HIGH	REV CONTACTOR COIL

Note: DI - Potential Free Signal
DO - Potential Free Contact

STAR-DELTA



DI/DO	TERMINAL NO.	FUNCTION/SOURCE	ACT. TYPE	APPLICATION
DI1	IC-11	LSTRT>	ACT. HIGH	LOCAL START
DI2	IC-12	LSTOP	ACT. LOW	LOCAL STOP
DI4	IC-14	TRIP RESET	ACT. HIGH	TRIP RESET
DO1	O1-C1	CONTACTOR O/P3	ACT. HIGH	MAIN CONTACTOR COIL
DO2	O2-C1	CONTACTOR O/P2	ACT. HIGH	DELTA CONTACTOR COIL
DO3	O3-C2	CONTACTOR O/P1	ACT. HIGH	STAR CONTACTOR COIL

Note: DI - Potential Free Signal
DO - Potential Free Contact

Product Dimensions

iMMR Module Name	Dimensions (H x W x D) in mm
Main Module	112 x 45 x 90
CT1, CT1VT module	126 x 45 x 55
CT2, CT2VT module	126 x 45 x 55
Display Module	51 x 96 x 36

Metering Data

- Current - R, Y, B, EF, Unbalance
- Voltage, Frequency, KW, KVAR, KVA, PF, KWh, KVARh, KVAh
- Voltage and Current THD
- Thermal Memory, Motor status, Starting current and time
- Thermal time to trip, time to cool, Run hours

Motor Protection Relay

- Economical motor protection relay - MPR 200nX / MPR 300
- Intelligent motor protection & control relay - MCOMP



MPR 300

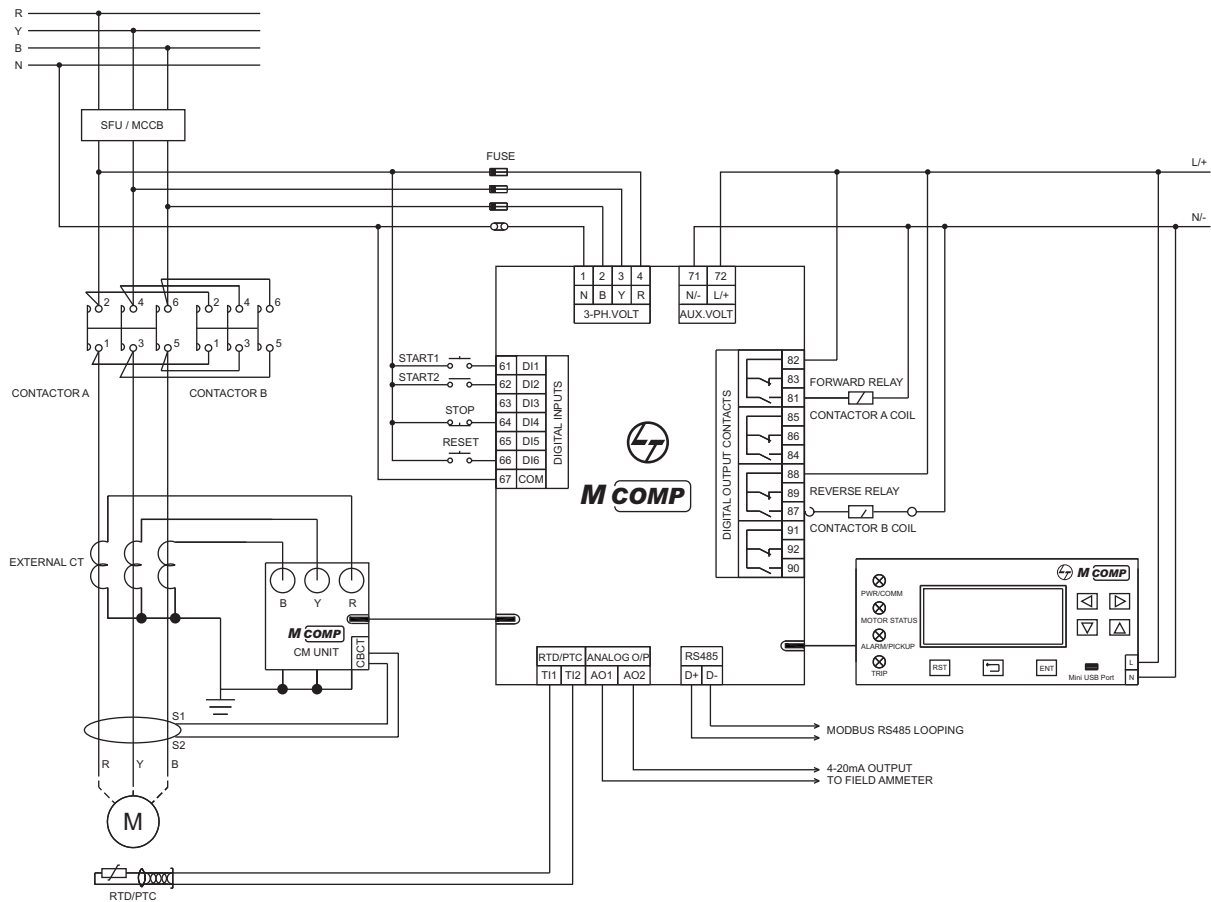


MCOMP Relay

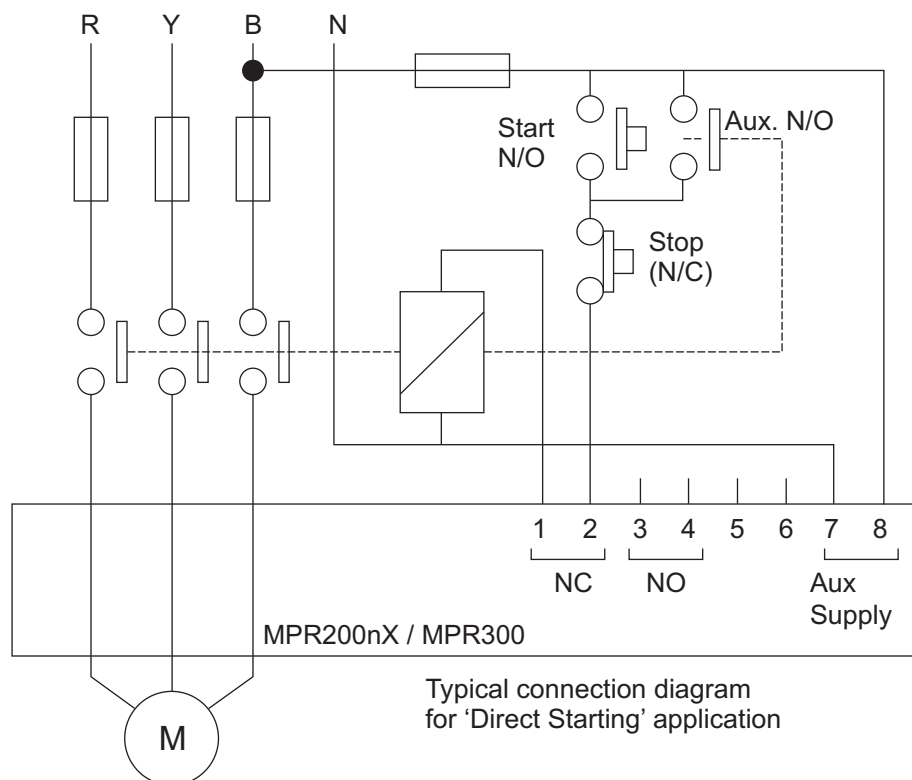
Model	MPR 200nX	MPR 300	MCOMP
Description	Motor protection	Motor protection	Motor protection
Device code	49, 51LR, 46, 37	49, 51LR, 64, 46, 37	49, 14, 46, 50N, 37, 59, 27, 47, 81H, 81L, 66, 27LV, 47a, 47b
Design	Numeric	Numeric	Numeric
Functions available	Thermal overload	Thermal overload	Thermal over load
	Locked rotor	Locked rotor	Locked rotor
	Single phasing	Earth fault	Current unbalance
	No load running	Single phasing	Phase loss
	Phase sequence reversal	No load running	Under current
		Phase sequence reversal	Over voltage
			Under voltage
			Over frequency
			Under frequency
			Max. no. of starts
Other features	upto 88 A	upto 88 A	Reacceleration
	Trip time characteristics as per IEC947	Trip time characteristics as per IEC947	Phase reversal
			Intelligent relay with separate protection, display and CT modules
			Suitable for 50 / 60 Hz
			Can be used with DOL, RDOL and Star delta starters
			Communication options -
			Modbus RTU, Modbus TCP IP and Profibus
Burden on PT	Not applicable	Not applicable	Not applicable
Burden on CT	Not applicable	Not applicable	Not applicable
Operating temp	0-60°C	0-60°C	10 to 60°C
Weight	< 0.5kg	< 0.5kg	< 2kg
Burden on auxiliary supply	< 8 VA	< 8 VA	< 8 VA
Output contacts	1NO + 1NC	1NO + 1NC	4 C/O
Dim W x H x D in mm	70 x 85 x 106	70 x 85 x 106	Split protection unit 92 x 123 x 103.95
Auxiliary supply	240 V AC / 110 V AC	240 V AC / 110 V AC	80 - 240 V AC / DC

Wiring Diagrams

MCOMP Relay



MPR200nX / MPR300 Relay



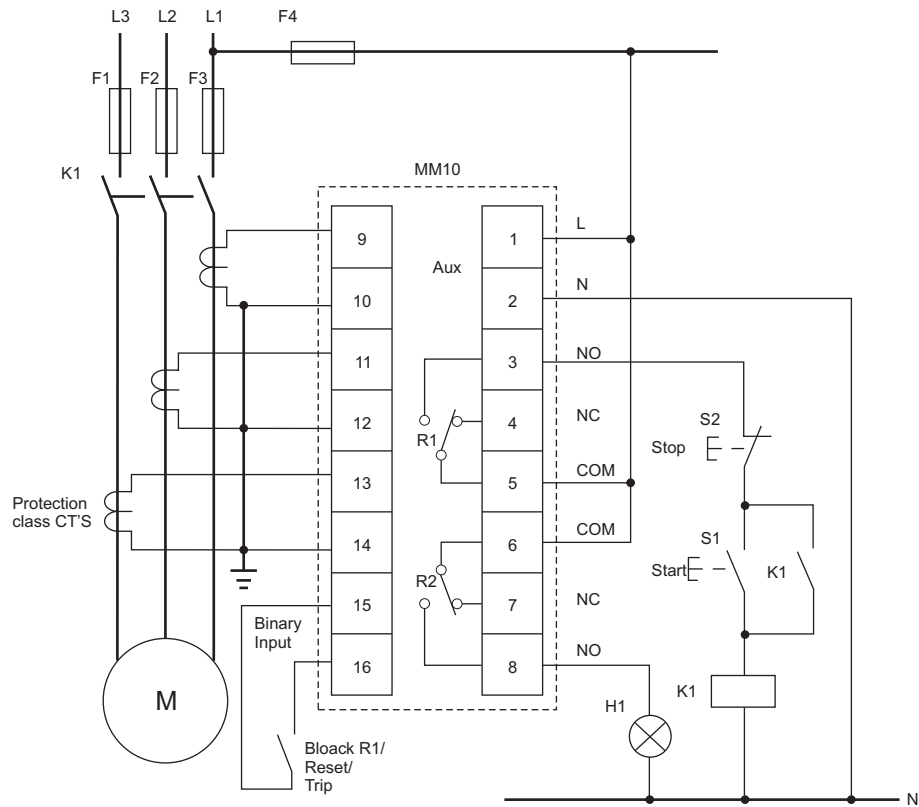
- ## Salient Features

-

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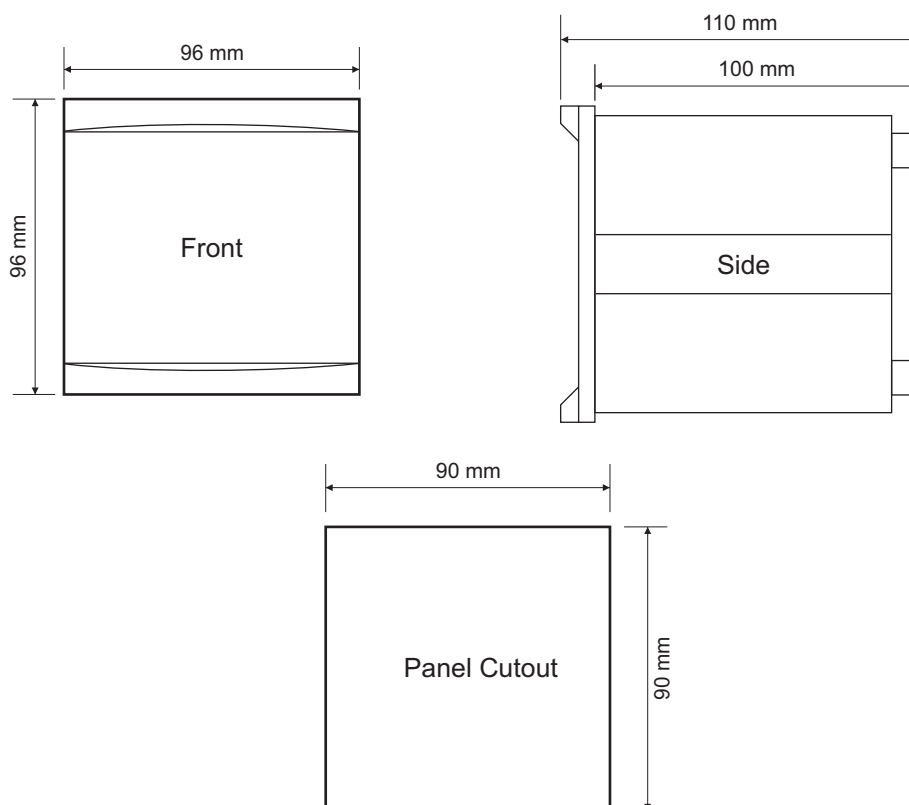
Wiring Diagrams

MM10 relay



External CT's - Protection class CT's [5 - 1000 Amps] with 5 Amp secondary

Dimensions



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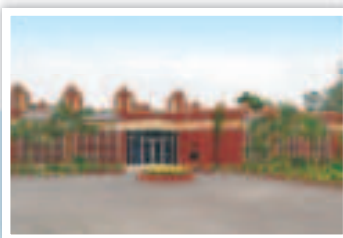
- Low Voltage & Medium Voltage Switchgear
- Switchboard Electrical Design
- AC Drives & Building Management Solutions
- Protective Relays & Earthing
- Power Quality Solutions

Please contact any of the training centres for participation and detailed training programme schedule.



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