Mikro®

PRODUCT CATALOGUE 2018 /19

contents

reference colour tags

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Combined Overcurrent & Earth Fault Relay

MK3000L

Features

- Multifunction numerical relay
- Three-phase, three stages setting for phase overcurrent and earth fault
- Negative sequence overcurrent
- IDMT and definite time
- Multi-shot autoreclose
- Thermal overload protection
- Two groups of protection settings
- Disturbance records
- Inrush blocking
- Trip circuit supervision
- Circuit breaker failure protection
- Circuit breaker monitoring and alarm
- Circuit breaker open/close control
- Programmable LED
- RS232 and RS485 MODBUS-RTU communication
- Fault, alarm and event records with timestamp
- Multifunction programmable outputs
- Multifunction digital inputs
- Complies with IEC 60255 standard
- ANSI code: 46N, 49RMS, 50P, 50G, 51P, 51G, CLP, 50BF, 74TC, 79

Technical Data

RATINGS
AUXILIARY SUPPLY

Model MK3000L-150D

Rated voltage : 30 ~ 120 V DC
Operating voltage : 24 ~ 150 V DC

Model MK3000L-240D

Rated voltage : 100~240 V AC or 140~340 V DC
Operating voltage : 85~265 V AC or 110~370 V DC
Rated frequency : 50 or 60Hz
Operating frequency : 45 ~ 65 Hz
Power consumption : 8 VA max

CURRENT INPUTS

Rated current I_n, I_{on} : 1 or 5 A by connection
Frequency : 50 or 60 Hz nominal
Burden : < 0.025 VA (1A)
: < 0.3 VA (5A)
Thermal withstand : 4 x I_n continuous
: 40 x I_n for 2 s
: 100 x I_n for 1 s

DIGITAL INPUTS

Input type : Optically isolated
Rated voltage : 20 ~ 380 V DC
: 50 ~ 270 V AC

OUTPUT CONTACTS

Trip Contact Relay (R1), R2, R3, R4, IRF Relay

Rated voltage : 250 V AC/DC
Continuous carry : 5 A
Expected electrical life : 100,000 operations at rated load
Expected mechanical life : 5 x 10^6 operations

RECORDS

Fault Record : Up to 50 records
Event Record : Up to 250 records
Alarm Record : Up to 30 records
Disturbance Record : 6 x 3s, 4 x 4s, 3 x 5s, 2 x 7s, 1 x 9s
Pre-Time 0.1s to [record length - 0.1s]

SETTING RANGES
GENERAL

Phase CT primary : 1 to 10000 A
Earth CT primary : 1 to 10000 A
Frequency : 50 or 60 Hz

PHASE OVERCURRENT

I> : 0.1 to 25 x I_n
(Recommended up to 2 x I_n for IDMT delay)
I> Delay type : IDMT or Definite Time
tI> : 0 to 100 s
I> IDMT curve : NI, VI, EI, LTI, NI 1.3/10
ktI : 0.01 to 1.00
I>> : 0.5 to 40 x I_n
tI>> : 0 to 100 s
I>>>? : Yes or No
I>>> : 0.5 to 40 x I_n
I>>> Sample : Yes or No
tI>>> : 0 to 100 s

EARTH FAULT

I_o> : 0.02 to 2 x I_{on}
(Recommended up to 0.5 x I_{on} for IDMT delay)
I_o> Delay type : IDMT or Definite Time
tI_o> : 0 to 100 s
I_o> IDMT curve : NI, VI, EI, LTI, NI 1.3/10
ktI_o : 0.01 to 1.00
I_o>> : 0.1 to 10 x I_{on}
tI_o>> : 0 to 100 s
I_o>>> : 0.1 to 10 x I_n
I_o>>> Sample : Yes or No
tI_o>>> : 0 to 100 s

NEGATIVE SEQUENCE OVERCURRENT

I_2> : 0.1 to 40 x I_n
(Recommended up to 2 x In for IDMT delay)
I_2> Delay type : IDMT or Definite Time
tI_2> : 0 to 100 s
I_2> IDMT curve : NI, VI, EI, LTI, NI 1.3/10
ktI_2 : 0.01 to 1.00
I_2>> : 0.1 to 40 x I_n
tI_2>> : 0 to 100 s

THERMAL OVERLOAD

Iθ> : 0.1 to 3 x I_n
Tθ : 1 to 200 minutes
k : 1 to 1.5
θ Trip : 50 to 200%
θ Alarm : 50 to 200%

AUTORECLOSE

Dead Time tD1-tD4 : 0.05 to 600 s
Reclaim Time tR : 0.02 to 600 s
Inhibit Time tI : 0.02 to 600 s
Phase Cycles : 0-4
Earth Cycles : 0-4

MEASUREMENT RANGE

Phase Current Secondary
5A input : 0 to 200 A
1A input : 0 to 40 A

EARTH CURRENT SECONDARY

5A input : 0 to 50A
1A input : 0 to 10A

ENVIRONMENTAL CONDITIONS

Temperature : -10°C to 55°C
Humidity : 5% to 95%, non-condensing

MECHANICAL

Mounting : Panel mounting
Dimension (mm) : 142(w) x 165(h) x 198(d)
Enclosure protection : IP54 at the panel
Approximate weight : 3kg

ACCURACY

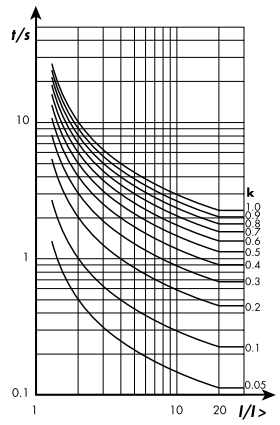
Current accuracy : ± 3% of the set value or 20mA secondary
Timing accuracy : ± 5% or ± 30ms

COMMUNICATION

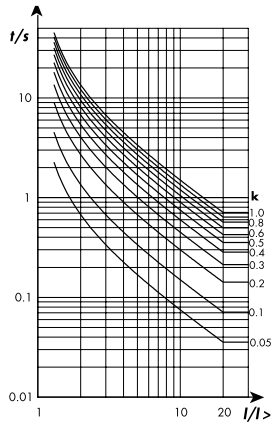
RS232 (front) : MODBUS-RTU
RS485 (back) : MODBUS-RTU

MK 3000L

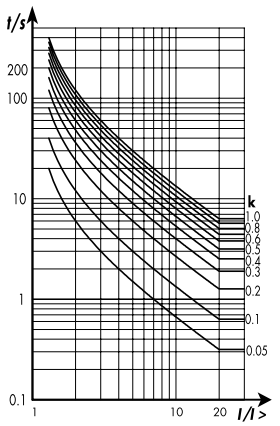
Normal Inverse



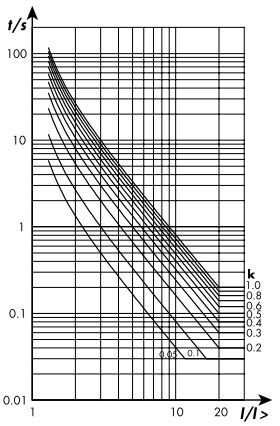
Very Inverse



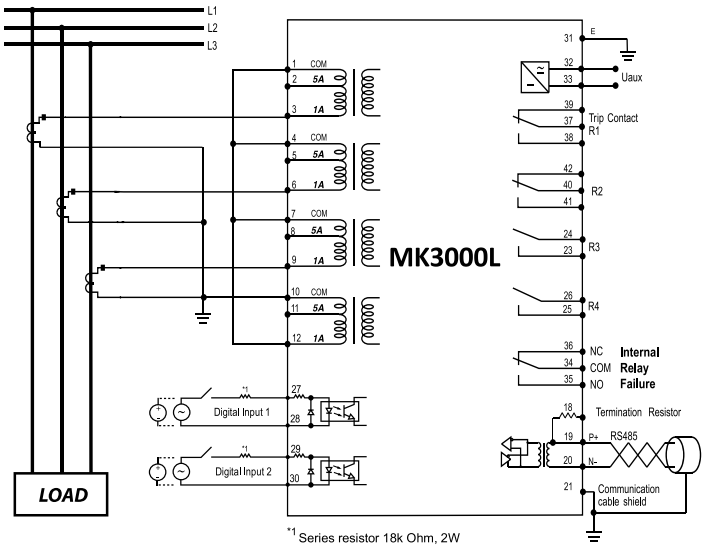
Long Time Inverse



Extremely Inverse

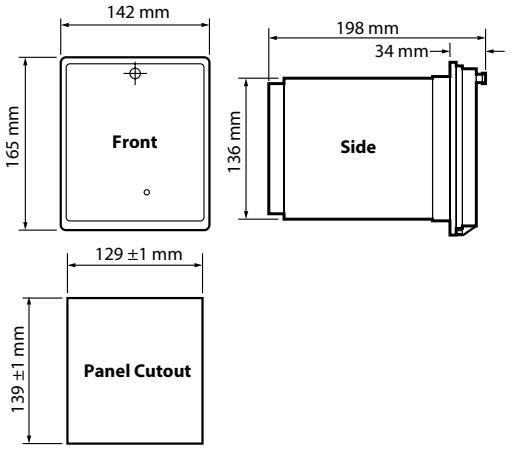


Typical Application Diagram 1

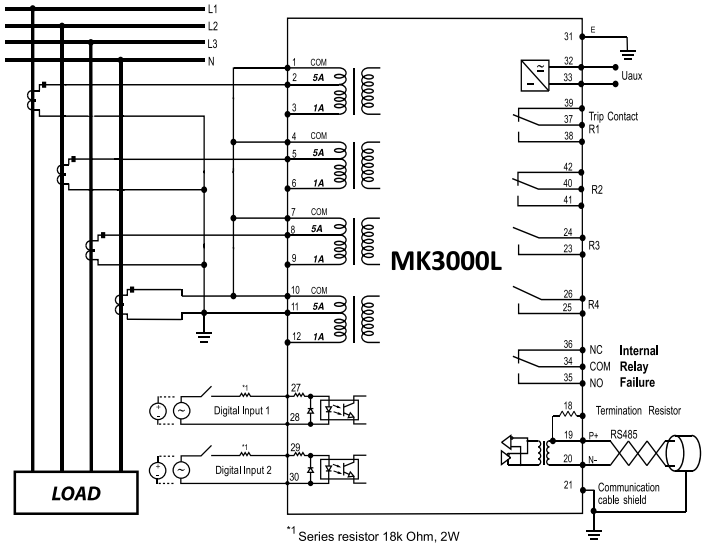


*1 Series resistor 18k Ohm, 2W required for >170 Vac / 240 Vdc to 270Vac / 380Vdc

Case Dimensions



Typical Application Diagram 2



*1 Series resistor 18k Ohm, 2W required for >170 Vac / 240 Vdc to 270Vac / 380Vdc

Ordering Information

MODEL	DESCRIPTION
MK3000L - 150D	For 50/60 Hz, auxiliary voltage 24 ~ 150V DC
MK3000L - 240AD	For 50/60 Hz, auxiliary voltage 85 ~ 265 V AC or 110 ~ 370 V DC

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Combined Overcurrent & Earth Fault Relay

MK2200L

Features

- Multifunction numerical relay
- Three-phase, three stages setting for phase overcurrent
- Two stages setting for earth fault
- IDMT and definite time
- Thermal overload protection
- Two groups of protection settings
- Trip circuit supervision
- Circuit breaker failure protection
- RS232 and RS485 MODBUS-RTU communication
- Fault, alarm and tripping records with timestamp
- Multifunction programmable outputs
- Multifunction digital inputs
- Complies with IEC 60255 standard
- ANSI code : 49RMS, 50P, 50G, 51P, 51G, CLP, 50BF, 74TC

Technical Data

AUXILIARY SUPPLY

Model MK2200L-150D

Rated voltage : 30 ~ 120 V DC
Operating voltage : 24 ~ 150 V DC

Model MK2200L-240AD

Rated voltage : 100 ~ 240 V AC or 140 ~ 340 V DC
Operating voltage : 85 ~ 265 V AC or 110 ~ 370 V DC
Rated frequency : 50 or 60 Hz
Operating frequency : 45 ~ 65 Hz
Power consumption : 8 VA max

CURRENT INPUTS

Rated current, I_n, I_{on}: 1 or 5 A by connection
Frequency : 50 or 60 Hz nominal
Burden : < 0.025 VA (1 A)
: < 0.3 VA (5 A)
Thermal withstand : 4 x I_n continuous
: 40 x I_n for 2s
: 100 x I_n for 1s

DIGITAL INPUTS

Input type : Optically isolated
Rated voltage : 20 ~ 380 V DC
: 50 ~ 270 V AC

OUTPUT CONTACTS

Trip Contact Relay R1, R2, R3, R4, IRF Relay

Rated voltage : 250 V AC / DC
Continuous carry : 5 A
Expected electrical life : 100,000 operations at rated load
Expected mechanical life : 5 x 10^6 operations

RECORDS

Fault Record : Up to 50 records
Event Record : Up to 250 records
Alarm Record : Up to 30 records

SETTING RANGES

GENERAL

Line CT primary : 1 to 10,000 A
Earth CT primary : 1 to 10,000 A
Frequency : 50 or 60 Hz

PHASE OVERCURRENT

I> : 0.1 to 25 x I_n (Recommended up to 2 x I_n for IDMT delay) *(Variable Steps)
I> Delay type : IDMT or definite time
tI> : 0 to 100 s *(Variable Steps)
I> IDMT curve : NI, VI, EI, LTI, NI 1.3/10
ktI : 0.01 to 1.00 (Step 0.01)
I>> : 0.5 to 40 x I_n *(Variable Steps)
tI>> : 0 to 100 s *(Variable Steps)
I>>> : 0.5 to 40 x I_n *(Variable Steps)
I>>> Sample : Yes or No
tI>>> : 0 to 100 s *(Variable Steps)

EARTH FAULT

I_o> : 0.02 to 2 x I_{on} (Recommended up to 0.5 x I_{on} for IDMT delay)
I_o> Delay type : IDMT or definite time
tI_o> : 0 to 100 s *(Variable Steps)
I_o> IDMT curve : NI, VI, EI, LTI, NI 1.3/10
ktI_o : 0.01 to 1.00 (Step 0.01)
I_o>> : 0.1 to 10 x I_{on} *(Variable Steps)
tI_o>> : 0 to 100 s *(Variable Steps)

THERMAL OVERLOAD

Iθ > : 0.1 to 3 x I_n *(Variable Steps)
Tθ : 1 to 200 minutes (Step 1)
k : 1 to 1.5 (Step 0.01)
θ Trip : 50 to 200% (Step 1%)
θ Alarm : 50 to 200% (Step 1%)

** Variable Steps: 0.1-1.00: Step 0.01; 1.00-20: Step 0.1; >20: Step 1*

MEASUREMENT RANGES

Phase Current Secondary:
5 A input : 0 to 200 A
1 A input : 0 to 40 A

Earth Current Secondary:
5 A input : 0 to 50 A
1 A input : 0 to 10 A

ENVIRONMENTAL CONDITIONS

Temperature : -10°C to 55°C
Humidity : 5% to 95%, non-condensing

MECHANICAL

Mounting : Panel mounting
Dimension (mm) : 142(w) x 165(h) x 198(d)
Enclosure protection : IP54 at the panel
Approximate weight : 2.2 kg

ACCURACY

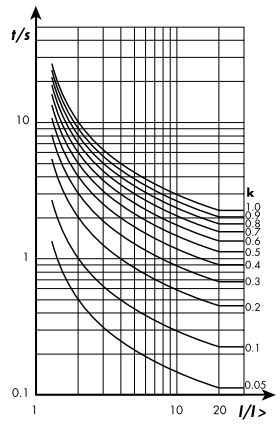
Current accuracy : ± 3% of the set value or 20mA secondary
Timing accuracy : ± 5% or ± 30ms

COMMUNICATION

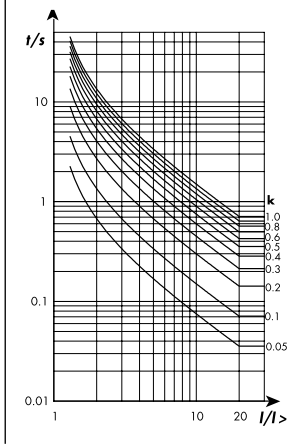
RS232 (front) : MODBUS-RTU
RS485 (back) : MODBUS-RTU

MK 2200L

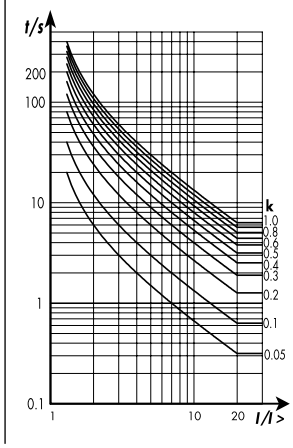
Normal Inverse



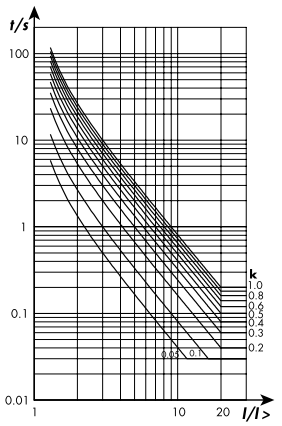
Very Inverse



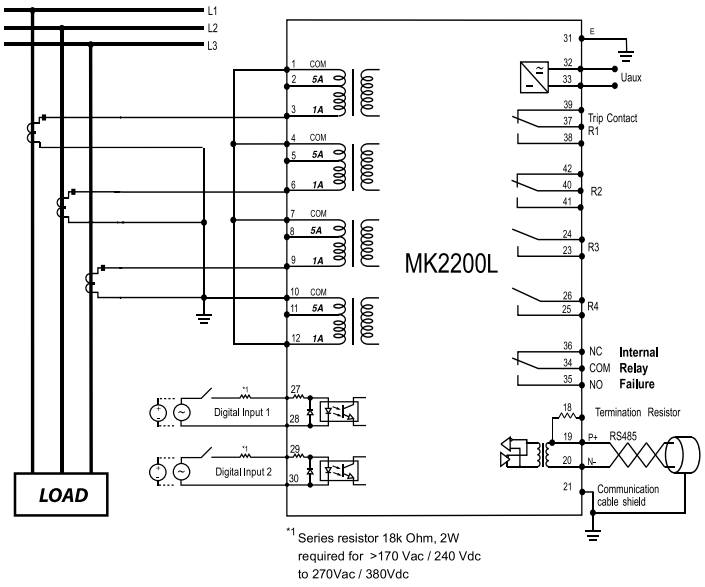
Long Time Inverse



Extremely Inverse

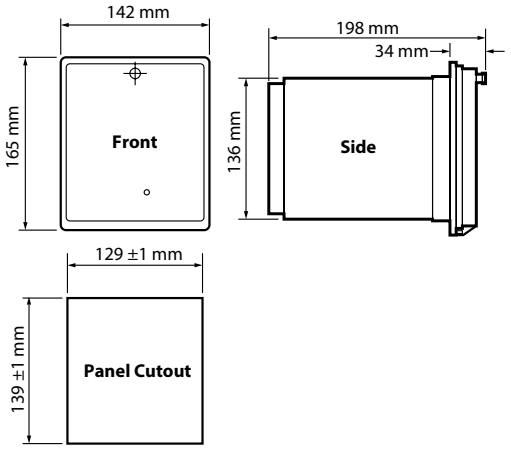


Typical Application Diagram 1

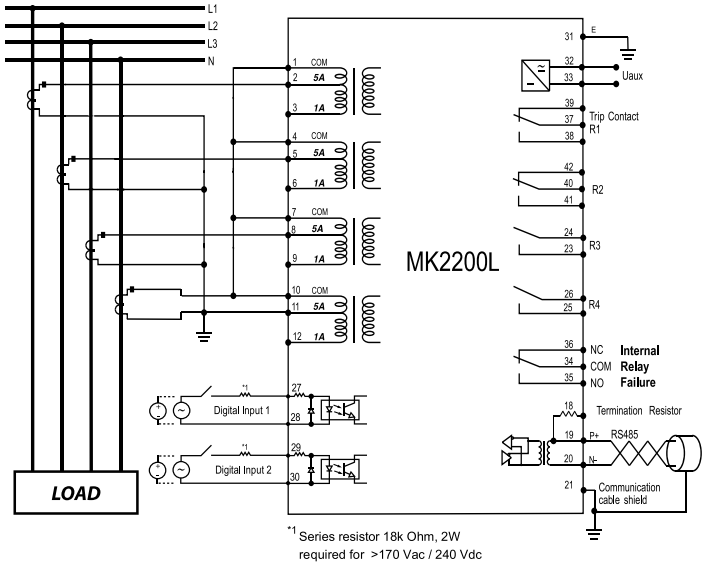


*1 Series resistor 18k Ohm, 2W required for >170 Vac / 240 Vdc to 270Vac / 380Vdc

Case Dimensions



Typical Application Diagram 2



*1 Series resistor 18k Ohm, 2W required for >170 Vac / 240 Vdc to 270Vac / 380Vdc

Ordering Information

MODEL	DESCRIPTION
MK2200L - 150D	For 50/60 Hz, auxiliary voltage 24 ~ 150 V DC
MK2200L - 240AD	For 50/60 Hz, auxiliary voltage 85 ~ 265 V A or 110 ~ 370 V DC

NX1000A

Features

- Microprocessor based numerical relay
- Current measurement based on fundamental frequency
- Three-phase, low-set overcurrent
- Three-phase, high-set overcurrent
- Low-set earth-fault
- High-set earth-fault
- Definite time for low-set and high-set
- Five selectable IDMT characteristic curves
- Local display of measured and set values
- Programmable relay outputs
- Non-volatile fault values recording
- Complies with IEC 60255 standard
- ANSI Code : 50P, 50N, 51P, 51N

Technical Data

RATINGS

Rated current (I_n)	: 5 A
Rated frequency	: 50 or 60 Hz
Burden	: < 0.3 VA at I_n
Themal withstand	: 4 x I_n continuous

AUXILIARY SUPPLY

Model NX1000A-240A(6)	: 198 ~ 265 V AC
Model NX1000A-240AD(6)	: 85 ~ 265 V AC 110 V DC ~ 340 V DC
Model MK1000A-150D(6)	: 24 ~ 150 V DC
Supply frequency	: 50 or 60 Hz
V A rating	: 3 VA typical

ACCURACY

Protection thresholds	: ± 5%
Time delay	: ± 5% with a minimum of 50 ms

OUTPUT CONTACTS

Trip Contacts (R1 & R2)	
Rated voltage	: 250V AC / DC
Contact rating	: 5 A
Expected electrical life	: 100,000 operations at rated current
Expected mechanical life	: 5 x 10^6 operations

SETTING RANGES

I) OVERCURRENT ELEMENTS

Low-set (I>)	: 0.5 A to 10.0 A, step 0.05 A
	: 10% to 200%, step 1%
Low-set time multiplier (kt>)	: 0.05 to 1.0, step 0.01
Low-set definite time (t>)	: 0.05 to 99s
High-set (I>>)	: 0.5 A to 99.9 A, step 0.10 A or disable
	: 10% to 1998%, step 2%
High-set delay time (t>>)	: 0.05 sec to 2.5 sec, step 0.01

II) EARTH-FAULT ELEMENT

Low-set (I_o>)	: 0.10 A to 5.0 A, step 0.05 A
	: 2% to 100%
Low-set time multiplier(kt_o>)	: 0.05 to 1.0, step 0.01
Low-set definite time (t_o>)	: 0.05 to 99s
High-set (I_o>>)	: 0.10 A to 50 A, step 0.10 A or disable
	: 2% to 1000%, step 2%
High-set delay time (t_o>>)	: 0.05 sec to 2.5 sec, step 0.01

INDICATORS

Auxiliary supply	: Green indicator
Pick-up	: Red indicator
Trip	: 7-segment display and Red indicators

ENVIRONMENTAL CONDITIONS

Temperature	: -10˚C to +55˚C
Humidity	: 5% to 95%, non-condensing

MECHANICAL

Mounting	: Panel mounting
Dimension (mm)	: 96(w) x 96(h) x 110(d)
Enclosure protection	: IP54 at the panel
Approximate weight	: 0.8 kg

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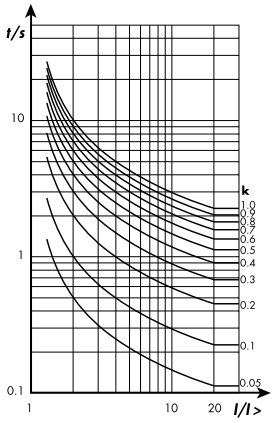
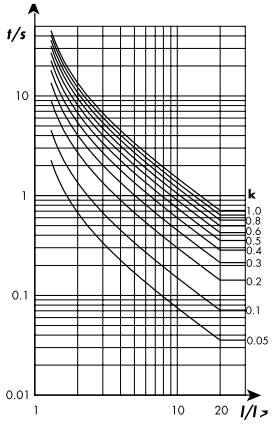
Combined Overcurrent & Earth Fault Relay

NX 1000A

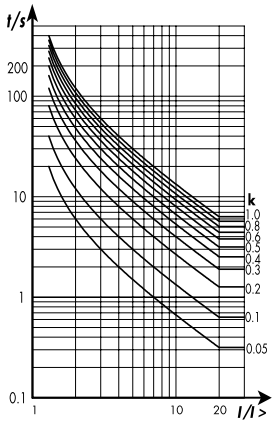
Normal Inverse



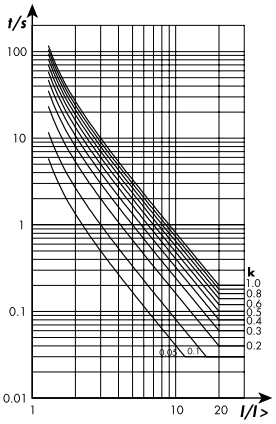
Very Inverse



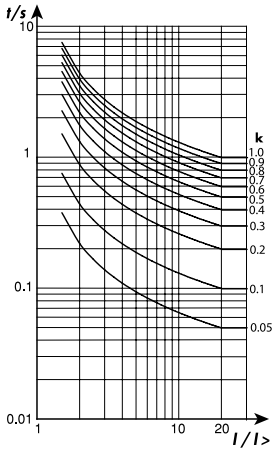
Long Time Inverse



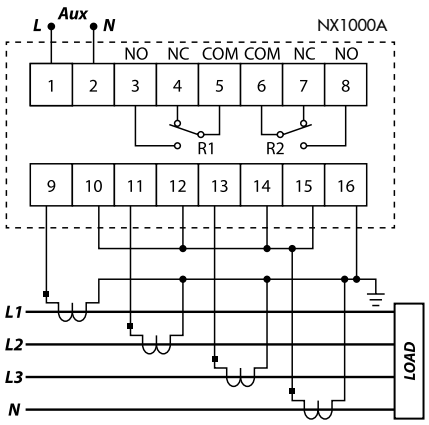
Extremely Inverse



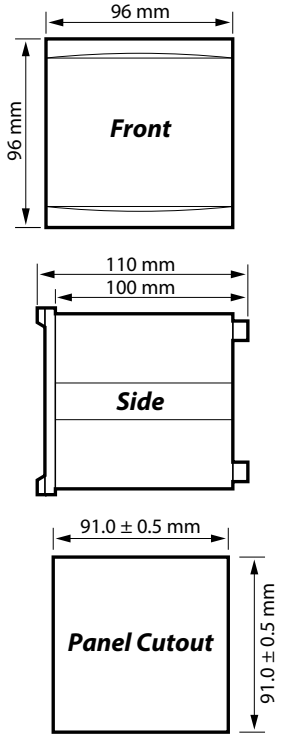
Normal Inverse 1.3/10



Typical Application Diagram



Case Dimensions



Ordering Information

MODEL	DESCRIPTION
NX1000A-240A	For 50Hz system, auxiliary voltage 198 ~ 265 V AC
NX1000A-240AD	For 50Hz system, auxiliary voltage 85 ~ 265 V AC or 110~340 V DC
NX1000A-150D	For 50Hz system, auxiliary voltage 24 ~ 150 V DC
NX1000A-240AD6	For 60Hz system, auxiliary voltage 85 ~ 265 V AC or 110~340 V DC
NX1000A-150D6	For 60Hz system, auxiliary voltage 24 ~ 150 V DC

NX233A

Features

- Microprocessor based numerical relay
- Current measurement based on fundamental frequency
- Three-phase, low-set overcurrent
- Three-phase, high-set overcurrent
- Local display of measured and set values
- Definite time for low-set and high-set
- Non-volatile fault value recording
- Programmable relay outputs
- Five selectable IDMT characteristic curves
- Complies with IEC 60255 standard
- ANSI Code : 50P, 51P

Technical Data

RATINGS

Rated current (I_n)	: 5 A
Rated frequency	: 50 or 60 Hz
Burden	: < 0.3 VA at I_n
Thermal withstand	: 4 x I_n continuous

ACCURACY

Protection thresholds	: ± 5%
Time delay	: ± 5% with a minimum of 50 ms

INDICATORS

Auxiliary supply	: Green indicator
Pick-up	: Red indicator
Trip	: 7-segment display and Red indicators

AUXILIARY SUPPLY

Model NX233A-240A (6)	: 198 ~ 265 V AC
Model NX233A-110A (6)	: 94 ~ 127 V AC
Supply frequency	: 50 or 60 Hz
VA rating	: 3 VA typical

OUTPUT CONTACTS (R1 & R2)

Rated voltage	: 250V AC / DC
Contact rating	: 5 A
Expected electrical life	: 100,000 operations at rated current
Expected mechanical life	: 5 x 10^6 operations

ENVIRONMENTAL CONDITIONS

Temperature	: -10°C to 55°C
Humidity	: 5% to 95%, non-condensing

MECHANICAL

Mounting	: Panel mounting
Dimension (mm)	: 96(w) x 96(h) x 110(d)
Enclosure protection	: IP54 at the panel
Approximate weight	: 0.8 kg

SETTING RANGES

Low-set (I >)	: 0.5 A to 6.0 A, step 0.05 A / 10% to 120%, step 1%
Low-set time multiplier (kt >)	: 0.05 to 1.0, step 0.01
Low-set definite time (t >)	: 0.05 to 99 sec, step 0.01 (0.05 to 1.0) / 0.1 (1.0 to 99)
High-set (I >>)	: 0.5 A to 99.9 A or disable, step 0.10 A / 10% to 1998%, step 2%
High-set delay time (t >>)	: 0.05 sec to 2.5 sec, step 0.01

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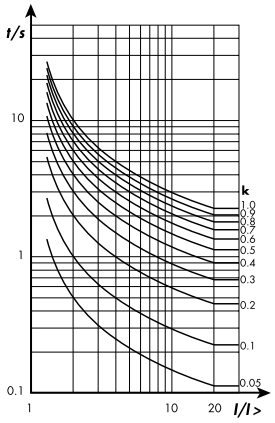
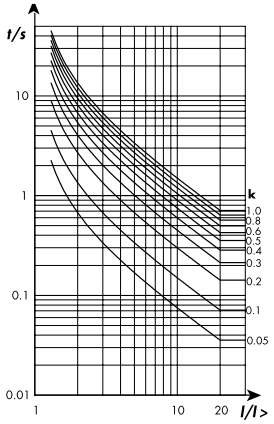
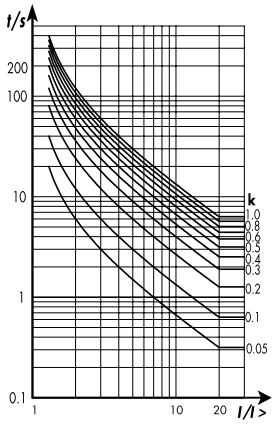
Normal Inverse



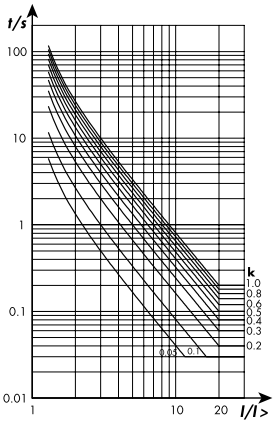
Very Inverse



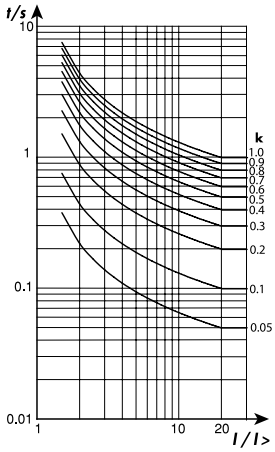
Long Time Inverse



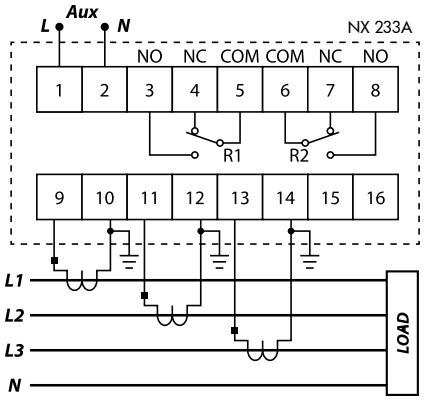
Extremely Inverse



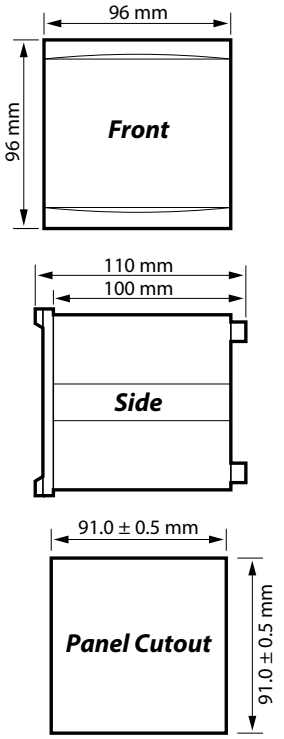
Normal Inverse 1.3/10



Typical Application Diagram



Case Dimensions



Ordering Information

MODEL	DESCRIPTION
NX233A - 240A	For 50 Hz system, auxiliary voltage198 ~ 265 V AC
NX233A - 110A	For 50 Hz system, auxiliary voltage 94 ~ 127 V AC
NX233A - 240A6	For 60 Hz system, auxiliary voltage198 ~ 265 V AC
NX233A -110A6	For 60 Hz system, auxiliary voltage 94 ~ 127 V AC

NX234A

Features

- Microprocessor based numerical relay
- Current measurement based on fundamental frequency
- Three-phase, low-set overcurrent
- Three-phase, high-set overcurrent
- Local display of measured and set values
- Definite time for low-set and high-set
- Non-volatile fault value recording
- Programmable relay outputs
- Complies with IEC 60255 standard
- ANSI Code : 50P, 51P

Technical Data

RATINGS

Rated current (I_n)	: 5 A
Rated frequency	: 50 or 60 Hz
Burden	: < 0.3 VA at I_n
Thermal withstand	: 4 x I_n continuous

ACCURACY

Protection thresholds	: ± 5%
Time delay	: ± 5% with a minimum of 50 ms

INDICATORS

Auxiliary supply	: Green indicator
Pick-up	: Red indicator
Trip	: 7-segment display and Red indicators

AUXILIARY SUPPLY

Model NX234A-240A (6)	: 198 ~ 265 V AC
Model NX234A-110A (6)	: 94 ~ 127 V AC
Supply frequency	: 50 or 60 Hz
VA rating	: 3 VA typical

OUTPUT CONTACTS (R1 & R2)

Rated voltage	: 250V AC / DC
Contact rating	: 5 A
Expected electrical life	: 100,000 operations at rated current
Expected mechanical life	: 5 x 10^6 operations

ENVIRONMENTAL CONDITIONS

Temperature	: -10°C to 55°C
Humidity	: 5% to 95%, non-condensing

MECHANICAL

Mounting	: Panel mounting
Dimension (mm)	: 96(w) x 96(h) x 110(d)
Enclosure protection	: IP54 at the panel
Approximate weight	: 0.8 kg

SETTING RANGES

Low-set (I >)	: 0.5 A to 6.0 A, step 0.05 A / 10% to 120%, step 1%
Low-set definite time (t >)	: 0.05 to 99 sec, step 0.01 (0.05 to 1.0) / 0.1 (1.0 to 99)
High-set (I >>)	: 0.5 A to 99.9 A or disable, step 0.10 A / 10% to 1998%, step 2%
High-set delay time (t >>)	: 0.05 sec to 2.5 sec, step 0.01

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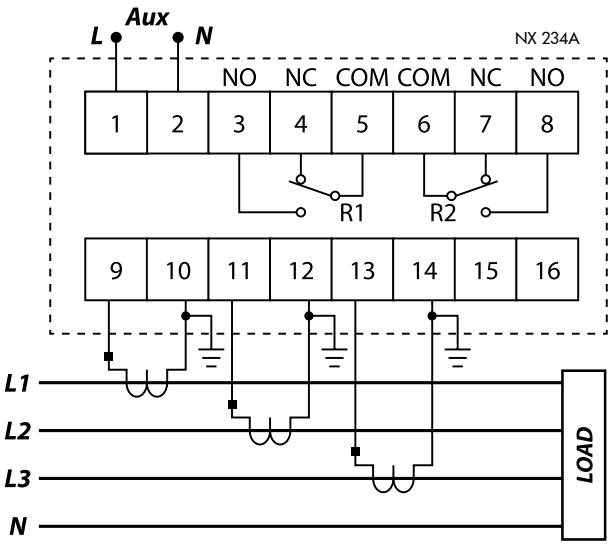
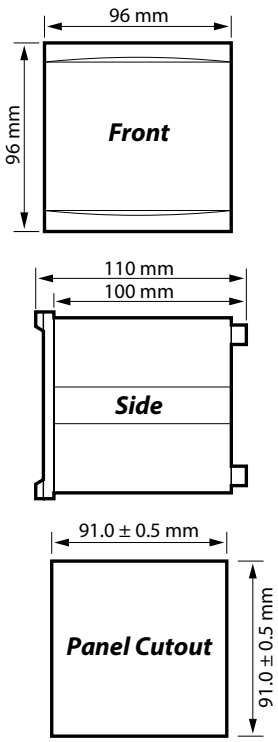
Typical Application Diagram



Case Dimensions



Ordering Information

MODEL	DESCRIPTION
NX234A - 240A	For 50 Hz system, auxiliary supply 198 ~ 265 V AC
NX234A - 110A	For 50 Hz system, auxiliary supply 94 ~ 127 V AC
NX234A - 240A6	For 60 Hz system, auxiliary supply 198 ~ 265 V AC
NX234A -110A6	For 60 Hz system, auxiliary supply 94 ~ 127 V AC

NX203A

Features

- Microprocessor based numerical relay
- Current measurement based on fundamental frequency
- Low-set IDMT normal inverse relay
- High-set instantaneous relay
- Separate low-set and high-set trip indicators
- Option to disable high-set element
- Front panel access to test function
- Complies with IEC 60255 standard
- ANSI Code : 50P, 51P

Technical Data

RATINGS

Rated current (I_n)	: 5 A
Rated frequency	: 50 Hz
Burden	: < 0.3 VA at I_n
Thermal withstand	: 4 x I_n continuous

AUXILIARY SUPPLY

Model NX203A-240A	: 198 ~ 265 V AC
Model NX203A-110A	: 94 ~ 127 V AC
Supply frequency	: 50 Hz
VA rating	: 3 VA typical

SETTING RANGES

Low-set (I >)	: 2.0 A to 6.0 A : 40% to 120%
Time multiplier (TM)	: 0.05 to 1.0
High-set (I >>)	: I > to 10 x I > or disable
High-set delay time (t >>)	: Instantaneous

TIME CURRENT CHARACTERISTIC CURVE

- Normal Inverse

OUTPUT CONTACTS

Trip contact (R1)	: Manual reset type
Rated voltage	: 250V AC
Contact rating	: 5 A
Expected electrical life	: 100,000 operations at rated current
Expected mechanical life	: 5 x 10^6 operations

INDICATORS

Auxiliary supply	: Green indicator
Pick-up	: Red indicator
Trip	: Red indicator

ACCURACY

Protection thresholds	: ± 5%
Time delay	: ± 5% with a minimum of 50 ms

ENVIRONMENTAL CONDITIONS

Temperature	: -10˚C to +55˚C
Humidity	: 5% to 95%, non-condensing

MECHANICAL

Mounting	: Panel mounting
Dimension (mm)	: 96(w) x 96(h) x 110(d)
Approximate weight	: 0.8 kg

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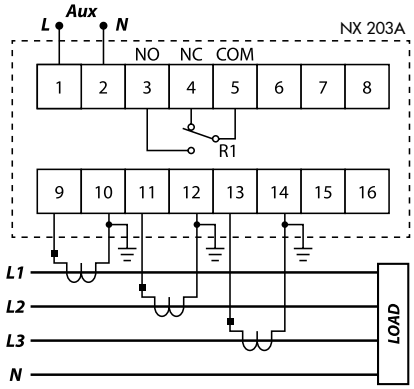
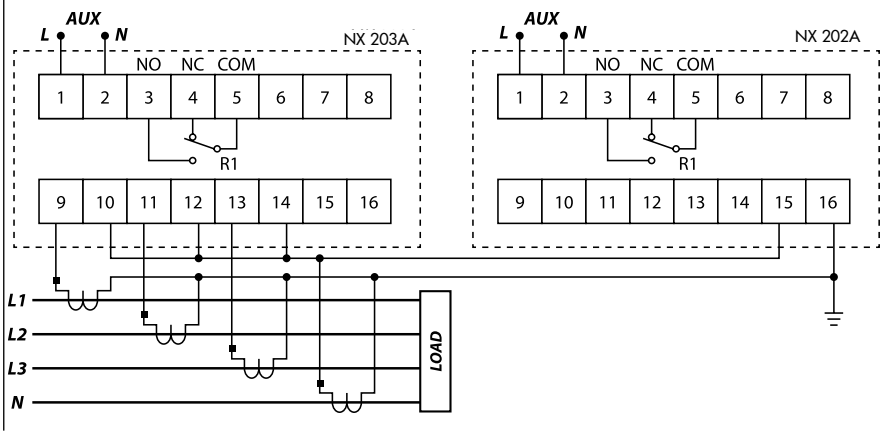
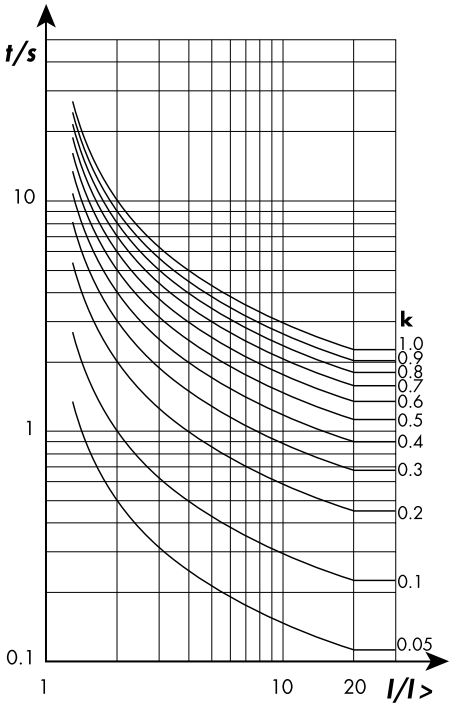
Typical Application Diagram



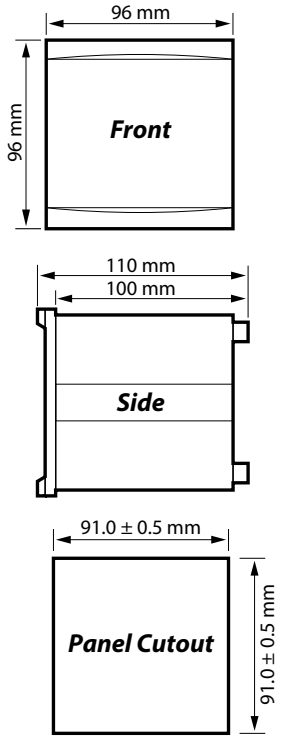
Combined IDMT Overcurrent & Earth Fault Relays



Normal Inverse



Case Dimensions



Ordering Information

MODEL	DESCRIPTION
NX203A - 240A	For 50 Hz system, auxiliary voltage 198 ~ 265 V AC
NX203A - 110A	For 50 Hz system, auxiliary voltage 94 ~ 127 V AC

NX204A

Features

- Microprocessor based numerical relay
- Current measurement based on fundamental frequency
- Low-set inverse definite time relay (IDT)
- High-set instantaneous relay
- Separate low-set and high-set trip indicators
- Option to disable high-set element
- Front panel access to test function
- Complies with IEC 60255 standard
- ANSI Code : 50P, 51P

Technical Data

RATINGS

Rated current (I_n)	: 5 A
Rated frequency	: 50 Hz
Burden	: < 0.3 VA at I_n
Thermal withstand	: 4 x I_n continuous

AUXILIARY SUPPLY

Model NX204A-240A	: 198 ~ 265 V AC
Model NX204A-110A	: 94 ~ 127 V AC
Supply frequency	: 50 Hz
VA rating	: 3 VA typical

SETTING RANGES

Low-set (I >)	: 2.0 A to 6.0 A
	: 40% to 120%
Time multiplier (TM)	: 0.05 to 1.0
High-set (I >>)	: I > to 10 x I > or disable
High-set delay time (t >>)	: Instantaneous

OUTPUT CONTACTS

Trip contact (R1)	: Manual reset type
Rated voltage	: 250V AC
Contact rating	: 5 A
Expected electrical life	: 100,000 operations at rated current
Expected mechanical life	: 5 x 10^6 operations

INDICATORS

Auxiliary supply	: Green indicator
Pick-up	: Red indicator
Trip	: Red indicator

ACCURACY

Protection thresholds	: ± 5%
Time delay	: ± 5% with a minimum of 50 ms

ENVIRONMENTAL CONDITIONS

Temperature	: -10°C to 55°C
Humidity	: 5% to 95%, non-condensing

MECHANICAL

Mounting	: Panel mounting
Dimension (mm)	: 96(w) x 96(h) x 110(d)
Approximate weight	: 0.8 kg

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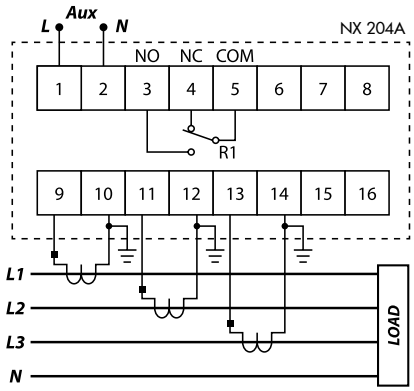
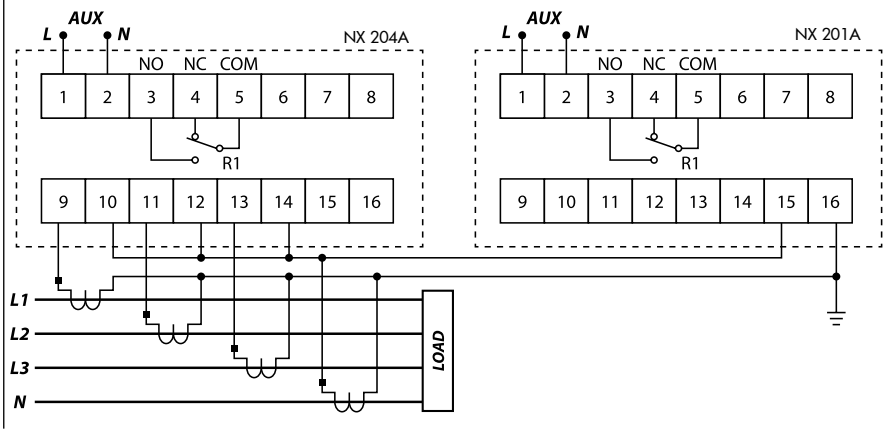
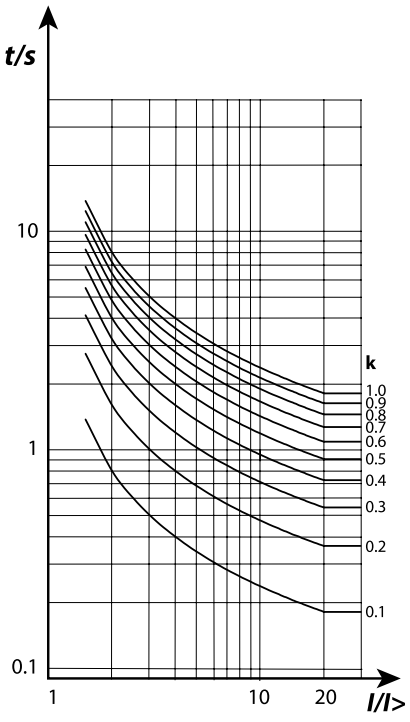
Typical Application Diagram



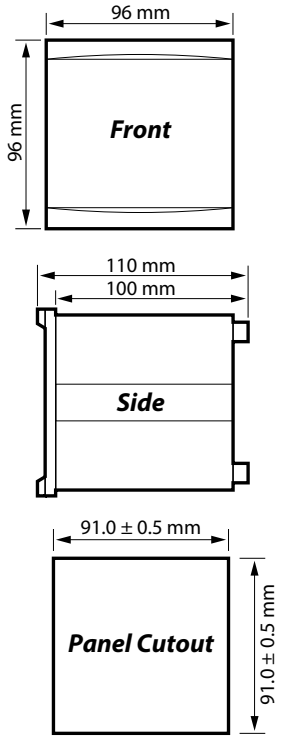
Combined Overcurrent & Earth Fault Relays



Inverse Definite Time



Case Dimensions



Ordering Information

MODEL	DESCRIPTION
NX204A - 240A	For 50 Hz system, auxiliary voltage 198 ~ 265 V AC
NX204A - 110A	For 50 Hz system, auxiliary voltage 94 ~ 127 V AC

NX231A

Features

- Microprocessor based numerical relay
- Current measurement based on fundamental frequency
- Two stages settings for earth fault
- Local display of measured and set values
- Definite time for low-set and high-set (DTL)
- Non-volatile fault value recording
- Programmable relay outputs
- Complies with IEC 60255 standard
- ANSI Code : 50N, 51N

Technical Data

RATINGS

Rated current (I_n)	: 5 A
Rated frequency	: 50 or 60 Hz
Burden	: < 0.3 VA at I_n
Thermal withstand	: 4 x I_n continuous

ACCURACY

Protection thresholds	: ± 5%
Time delay	: ± 5% with a minimum of 50 ms

INDICATORS

Auxiliary supply	: Green indicator
Pick-up	: Red indicator
Trip	: 7-segment display and Red indicators

AUXILIARY SUPPLY

Model NX231A-240A (6)	: 198 ~ 265 V AC
Model NX231A-110A (6)	: 94 ~ 127 V AC
Supply frequency	: 50 or 60 Hz
VA rating	: 3 VA typical

OUTPUT CONTACTS

Rated voltage	: 250V AC / DC
Contact rating	: 5 A
Expected electrical life	: 100,000 operations at rated current
Expected mechanical life	: 5 x 10^6 operations

ENVIRONMENTAL CONDITIONS

Temperature	: -10˚C to +55˚C
Humidity	: 5% to 95%, non-condensing

SETTING RANGES

Low-set (I >)	: 0.1 A to 5.0 A, step 0.05 A / 2% to 100%, step 1%
Low-set definite time (t >)	: 0.05 to 99 sec, step 0.01 (0.05 to 1.0) / 0.1 (1.0 to 99)
High-set (I >>)	: 0.1 A to 50 A or disable, step 0.1 A / 2% to 1000%, step 2%
High-set delay time (t >>)	: 0.05 sec to 2.5 sec, step 0.01

MECHANICAL

Mounting	: Panel mounting
Dimension (mm)	: 96(w) x 96(h) x 110(d)
Enclosure protection	: IP54 at the panel
Approximate weight	: 0.7 kg

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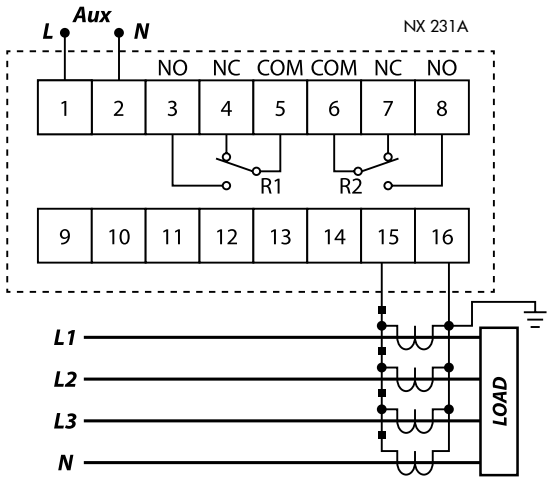
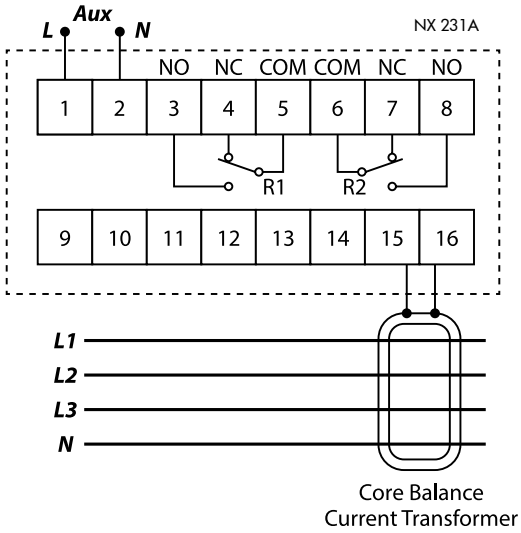
Typical Application Diagram 1



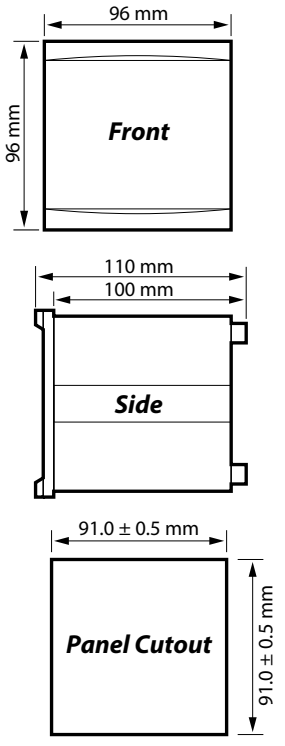
Typical Application Diagram 2



Ordering Information

MODEL	DESCRIPTION
NX231A - 240A	For 50 Hz system, auxiliary voltage 198 ~ 265 V AC
NX231A - 110A	For 50 Hz system, auxiliary voltage 94 ~ 127 V AC
NX231A - 240A6	For 60 Hz system, auxiliary voltage 198 ~ 265 V AC
NX231A -110A6	For 60 Hz system, auxiliary voltage 94 ~ 127 V AC

Case Dimensions



NX232A

Features

- Microprocessor based numerical relay
- Current measurement based on fundamental frequency
- Two stages settings for earth fault
- Local display of measured and set values
- Definite time for low-set and high-set
- Non-volatile fault value recording
- Programmable relay outputs
- Complies with IEC 60255 standard
- ANSI Code : 50N, 51N

Technical Data

RATINGS

Rated current (I_n)	: 5 A
Rated frequency	: 50 or 60 Hz
Burden	: < 0.3 VA at I_n
Thermal withstand	: 4 x I_n continuous

ACCURACY

Protection thresholds	: ± 5%
Time delay	: ± 5% with a minimum of 50 ms

INDICATORS

Auxiliary supply	: Green indicator
Pick-up	: Red indicator
Trip	: 7-segment display and Red indicators

AUXILIARY SUPPLY

Model NX232A-240A (6)	: 198 ~ 265 V AC
Model NX232A-110A (6)	: 94 ~ 127 V AC
Supply frequency	: 50 or 60 Hz
VA rating	: 3 VA typical

OUTPUT CONTACTS

Rated voltage	: 250V AC / DC
Contact rating	: 5 A
Expected electrical life	: 100,000 operations at rated current
Expected mechanical life	: 5 x 10^6 operations

ENVIRONMENTAL CONDITIONS

Temperature	: -10°C to 55°C
Humidity	: 5% to 95%, non-condensing

SETTING RANGES

Low-set (I >)	: 0.1 A to 5.0 A, step 0.05 A / 2% to 100%, step 1%
Low-set time multiplier (kt >)	: 0.05 to 1.0, step 0.01
Low-set definite time (t >)	: 0.05 to 99 sec, step 0.01 (0.05 to 1.0) / 0.1 (1.0 to 99)
High-set (I >>)	: 0.1 A to 50 A or disable, step 0.1 A / 2% to 1000%, step 2%
High-set delay time (t >>)	: 0.05 sec to 2.5 sec, step 0.01

MECHANICAL

Mounting	: Panel mounting
Dimension (mm)	: 96(w) x 96(h) x 110(d)
Enclosure protection	: IP54 at the panel
Approximate weight	: 0.7 kg

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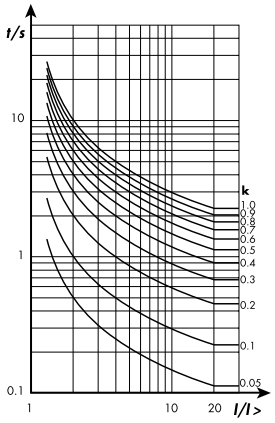
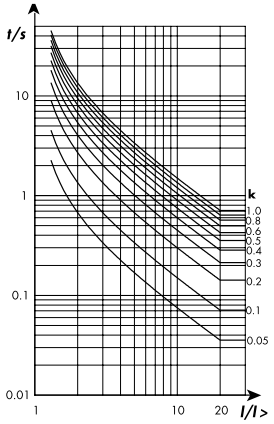
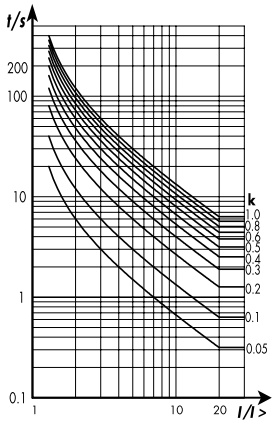
Normal Inverse



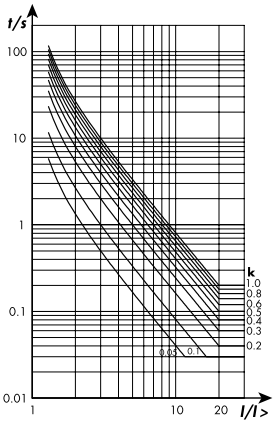
Very Inverse



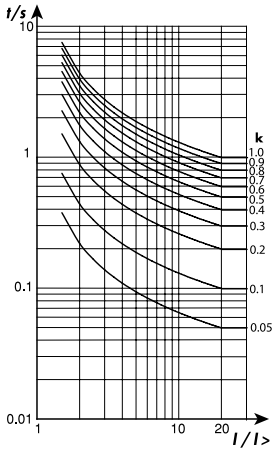
Long Time Inverse



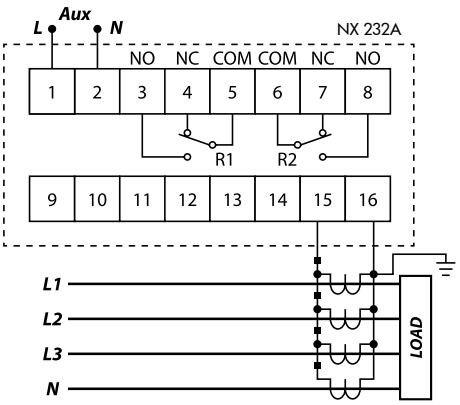
Extremely Inverse



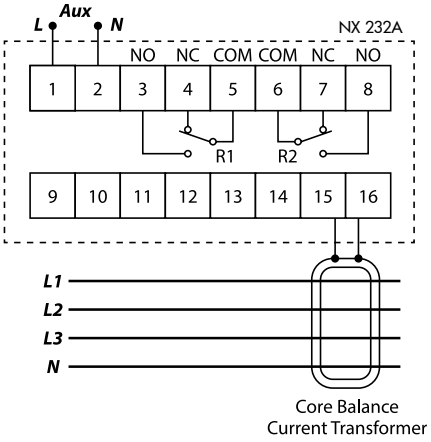
Normal Inverse 1.3/10



Typical Application Diagram 1



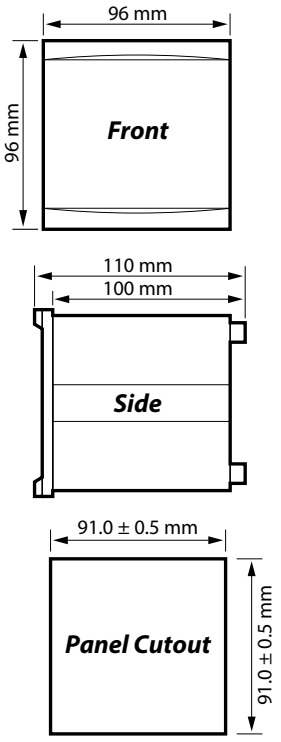
Typical Application Diagram 2



Ordering Information

MODEL	DESCRIPTION
NX232A - 240A	For 50 Hz system, auxiliary voltage 198 ~ 265 V AC
NX232A - 110A	For 50 Hz system, auxiliary voltage 94 ~ 127 V AC
NX232A - 240A6	For 60 Hz system, auxiliary voltage 198 ~ 265 V AC
NX232A -110A6	For 60 Hz system, auxiliary voltage 94 ~ 127 V AC

Case Dimensions



NX201A

Features

- Microprocessor based numerical relay
- Current measurement based on fundamental frequency
- Low-set definite time relay
- High-set instantaneous relay
- Separate low-set and high-set indicators
- Option to disable the high-set element
- Front panel access to the test function
- Complies with IEC 60255 standard
- ANSI Code : 50N, 51N

Technical Data

RATINGS

Rated current (I_n)	: 5 A
Rated frequency	: 50 Hz
Burden	: < 0.3 VA at I_n
Thermal withstand	: 4 x I_n continuous

ACCURACY

Protection thresholds	: ± 5%
Time delay	: ± 5% with a minimum of 50 ms

INDICATORS

Auxiliary supply	: Green indicator
Pick-up	: Red indicator
Trip	: Red indicator

AUXILIARY SUPPLY

Model NX201A-240A	: 198 ~ 265 V AC
Model NX201A-110A	: 94 ~ 127 V AC
Supply frequency	: 50 Hz
VA rating	: 3 VA typical

OUTPUT CONTACTS

Trip contact (R1)	: Manual reset type
Rated voltage	: 250V AC
Contact rating	: 5 A
Expected electrical life	: 100,000 operations at rated current
Expected mechanical life	: 5 x 10^6 operations

ENVIRONMENTAL CONDITIONS

Temperature	: -10°C to 55°C
Humidity	: 5% to 95%, non-condensing

SETTING RANGES

Low-set (I >)	: 0.1 A to 2.0 A
	: 2% to 40 %
Low-set delay time(DELAY)	: 0.05 to 1.0
High-set (I >>)	: I > to 10 x I > or disable
High-set delay time (t >>)	: Instantaneous

MECHANICAL

Mounting	: Panel mounting
Dimension (mm)	: 96(w) x 96(h) x 90(d)
Approximate weight	: 0.6 kg

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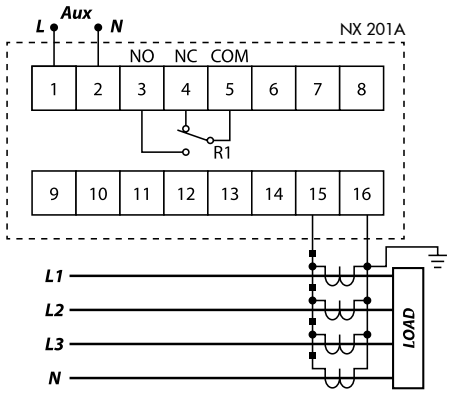
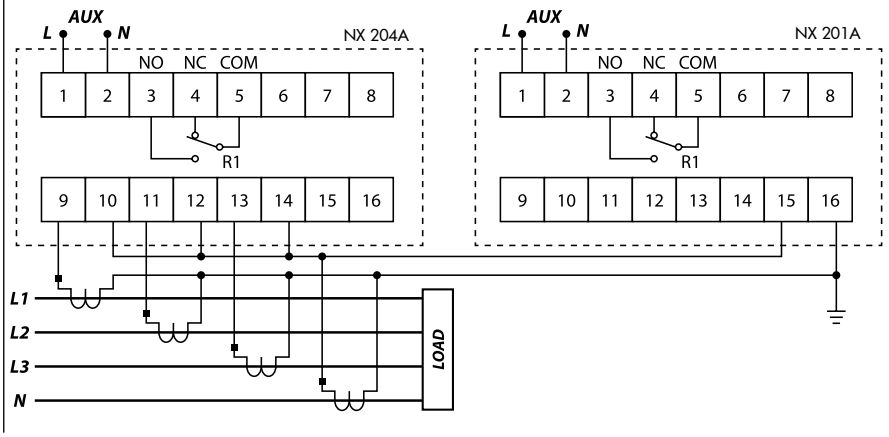
Typical Application Diagram



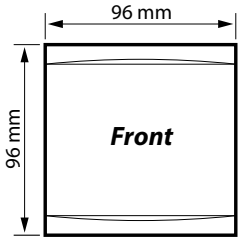
Combined IDMT Overcurrent & Earth Fault Relays

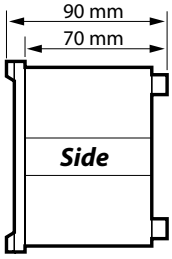


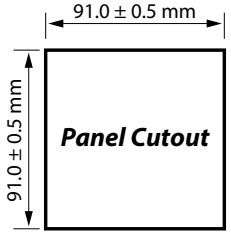
Ordering Information

MODEL	DESCRIPTION
NX201A - 240A	For 50 Hz system, auxiliary voltage 198 ~ 265 V AC
NX201A - 110A	For 50 Hz system, auxiliary voltage 94 ~ 127 V AC

Case Dimensions







NX202A

Features

- Microprocessor based numerical relay
- Current measurement based on fundamental frequency
- Low-set IDMT normal inverse relay
- High-set instantaneous relay
- Separate low-set and high-set trip indicators
- Option to disable the high-set element
- Front panel access to the test function
- Complies with IEC 60255 standard
- ANSI Code : 50N, 51N

Technical Data

RATINGS

Rated current (I_n)	: 5 A
Rated frequency	: 50 Hz
Burden	: < 0.3 VA at I_n
Thermal withstand	: 4 x I_n continuous

ACCURACY

Protection thresholds	: ± 5%
Time delay	: ± 5% with a minimum of 50 ms

INDICATORS

Auxiliary supply	: Green indicator
Pick-up	: Red indicator
Trip	: Red indicator

AUXILIARY SUPPLY

Model NX202A-240A	: 198 ~ 265 V AC
Model NX202A-110A	: 94 ~ 127 V AC
Supply frequency	: 50 Hz
VA rating	: 3 VA typical

OUTPUT CONTACTS

Trip contact (R1)	: Manual reset type
Rated voltage	: 250V AC
Contact rating	: 5 A
Expected electrical life	: 100,000 operations at rated current
Expected mechanical life	: 5 x 10^6 operations

ENVIRONMENTAL CONDITIONS

Temperature	: -10˚C to +55˚C
Humidity	: 5% to 95%, non-condensing

SETTING RANGES

Low-set (I >)	: 0.1 A to 2.0 A : 2% to 40%
Time multiplier (TM)	: 0.05 to 1.0
High-set (I >>)	: I>to10xI>ordisable
High-set delay time (t >>)	: Instantaneous

TIME CURRENT CHARACTERISTIC CURVE

- IDMT normal inverse

MECHANICAL

Mounting	: Panel mounting
Dimension (mm)	: 96(w) x 96(h) x 90(d)
Approximate weight	: 0.6 kg
Enclosure protection	: IP40 at the panel

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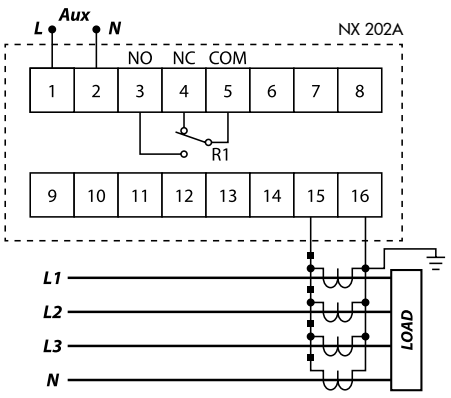
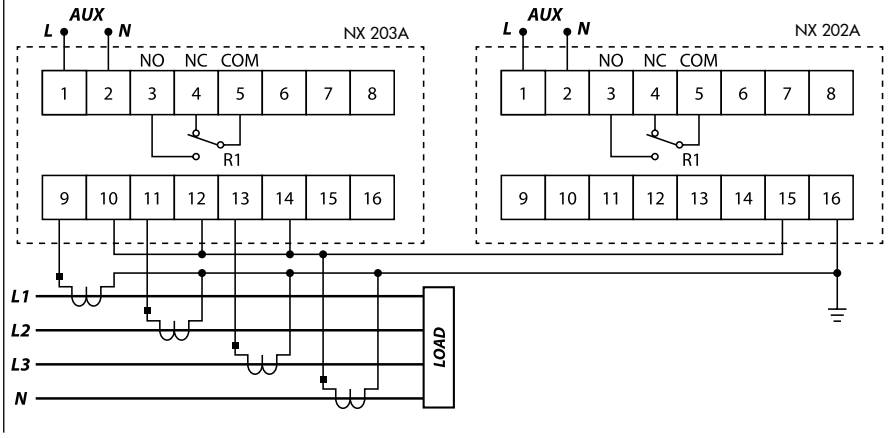
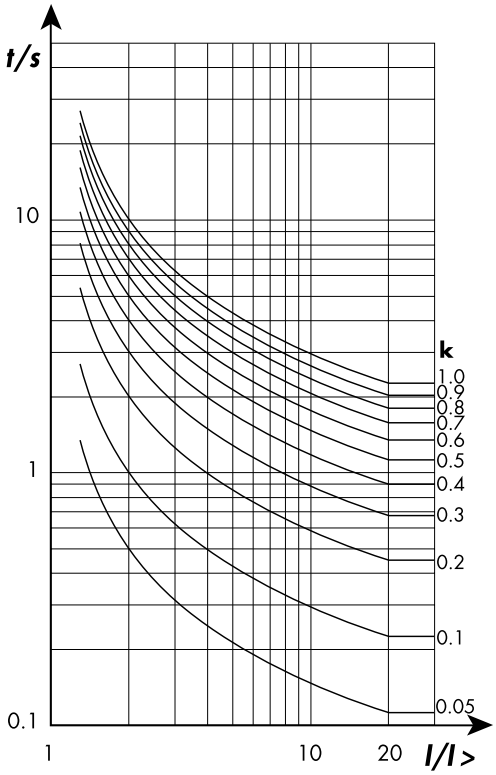
Typical Application Diagram



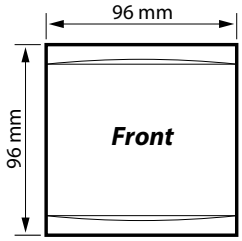
Combined IDMT Overcurrent & Earth Fault Relays

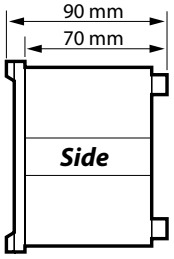


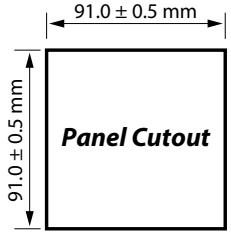
Normal Inverse



Case Dimensions







Ordering Information

MODEL	DESCRIPTION
NX202A - 240A	For 50 Hz system, auxiliary voltage 198 ~ 265 V AC
NX202A - 110A	For 50 Hz system, auxiliary voltage 94 ~ 127 V AC

N201

Features

- Microprocessor based numerical relay
- Current measurement based on fundamental frequency
- Low-set definite time relay
- High-set instantaneous relay
- Separate low-set and high-set indicators
- Option to disable the high-set element
- Front panel access to the test function
- Complies with IEC 60255 standard
- ANSI Code : 50N, 51N

Technical Data

RATINGS

Auxiliary Supply

Model N201-240AD

Rated voltage	: 100 ~ 240 V AC or 140 ~ 340 V DC
Operating voltage	: 85 ~ 265 V AC or 110 ~ 370 V DC
Rated frequency	: 50 or 60 Hz
Power consumption	: <3 VA max

Current Inputs

Rated current, I_n, I_{on}	: 5 A
Frequency	: 50 or 60 Hz nominal
Burden	: < 0.3 VA
Thermal withstand	: 4 x I_n continuous

Output Contacts

Trip Contact Relay R1, R2

Rated voltage	: 250 V AC / DC
Continuous carry	: 5 A
Expected electrical life	: 100,000 operations at rated load
Expected mechanical life	: 5 x 10^6 operations

SETTING RANGES

Low-set (I>)	: 0.1 to 2.0 A : 2% to 40%
Low-set delay time(DELAY)	: 0.05 to 1.0 sec
High-set (I>>)	: I> to 10 x I> or disable
High-set delay time (t>>)	: Instantaneous

ACCURACY

Protection thresholds	: ± 5%
Time delay	: ± 5% with a minimum of 50ms

INDICATORS

Auxiliary supply	: Green indicator
Pick-up	: Red indicator
Trip	: Red indicator

ENVIRONMENTAL CONDITIONS

Temperature	: -10°C to 55°C
Humidity	: 5% to 95%, non-condensing

MECHANICAL

Mounting	: Panel mounting
Dimension (mm)	: 72(w) x 72(h) x 97(d)
Enclosure protection	: IP40 at the panel
Approximate weight	: 0.3k g

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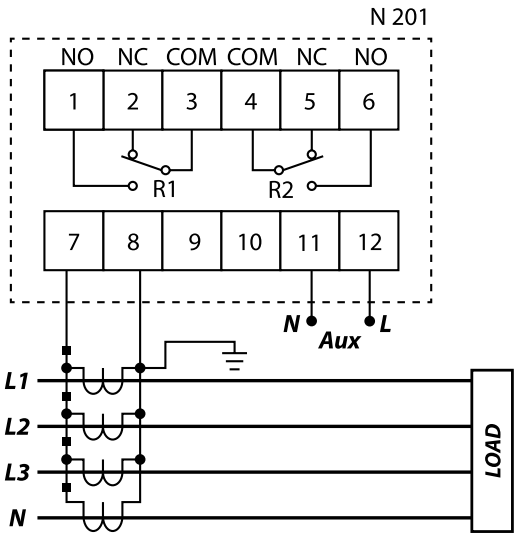
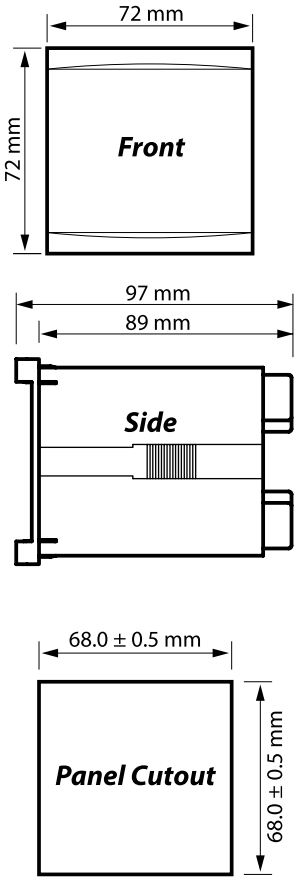
Typical Application Diagram



Case Dimensions



Ordering Information

MODEL	DESCRIPTION
N201 - 240AD	For 50 Hz system, auxiliary voltage 85~265 V AC / 110~370 V DC
N201 - 240AD	For 60 Hz system, auxiliary voltage 85~265 V AC / 110~370 V DC

N202

Features

- Microprocessor based numerical relay
- Current measurement based on fundamental frequency
- Low-set IDMT normal inverse relay
- High-set instantaneous relay
- Separate low-set and high-set trip indicators
- Option to disable the high-set element
- Front panel access to the test function
- Complies with IEC 60255 standard
- ANSI Code : 50N, 51N

Technical Data

RATINGS

Auxiliary Supply

Model N202-240AD

Rated voltage	: 100 ~ 240 V AC or 140 ~ 340 V DC
Operating voltage	: 85 ~ 265 V AC or 110 ~ 370 V DC
Rated frequency	: 50 or 60 Hz
Power consumption	: <3 VA max

Current Inputs

Rated current, I_n, I_{on}	: 5 A
Frequency	: 50 or 60 Hz nominal
Burden	: < 0.3 VA
Thermal withstand	: 4 x I_n continuous

Output Contacts

Trip Contact Relay R1, R2

Rated voltage	: 250 V AC / DC
Continuous carry	: 5 A
Expected electrical life	: 100,000 operations at rated load
Expected mechanical life	: 5 x 10^6 operations

SETTING RANGES

Low-set (I>)	:0.1 to 2.0 A
	:2% to 40%
Low-set delay time(TM)	:0.05 to 1.0
High-set (I>>)	: I> to 10 x I> or disable
High-set delay time (t>>)	:Instantaneous

ACCURACY

Protection thresholds	:± 5%
Time delay	:± 5% with a minimum of 50ms

TIME CURRENT CHARACTERISTIC CURVE

- IDMT Normal Inverse

INDICATORS

Auxiliary supply	:Green indicator
Pick-up	:Red indicator
Trip	:Red indicator

ENVIRONMENTAL CONDITIONS

Temperature	: -10°C to 55°C
Humidity	: 5% to 95%, non-condensing

MECHANICAL

Mounting	: Panel mounting
Dimension (mm)	: 72(w) x 72(h) x 97(d)
Enclosure protection	: IP40 at the panel
Approximate weight	: 0.3kg

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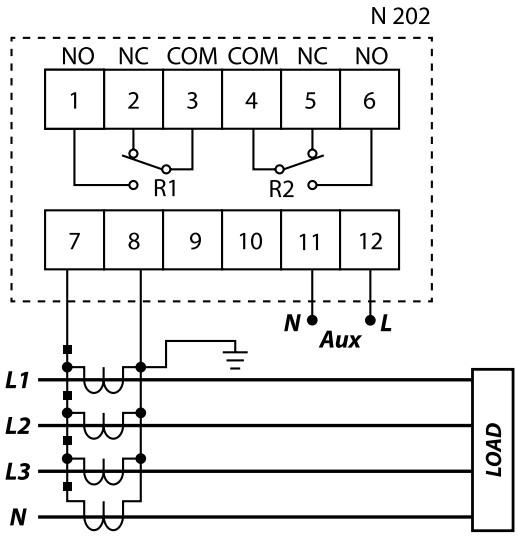
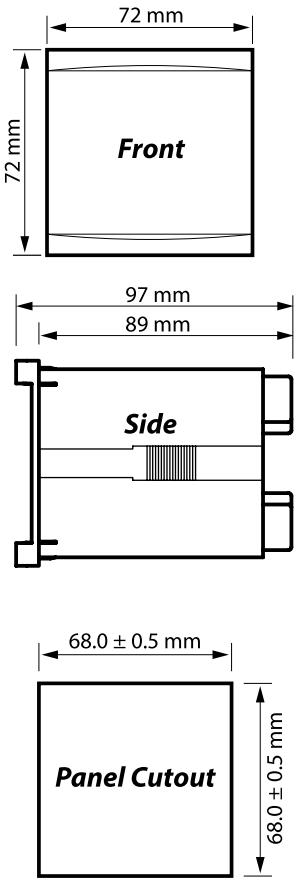
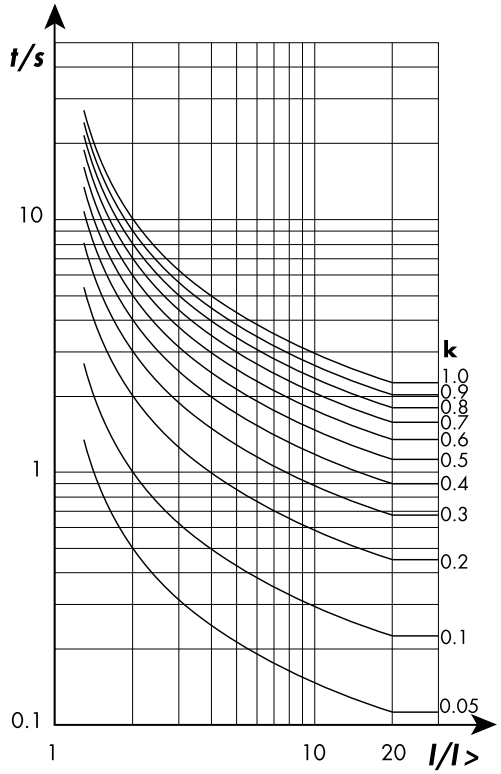
Typical Application Diagram



Case Dimensions



Normal Inverse



Ordering Information

MODEL	DESCRIPTION
N202 - 240AD	For 50 Hz system, auxiliary voltage 85 ~ 265 V AC / 110 ~ 370 V DC
N202 - 240AD6	For 60 Hz system, auxiliary voltage 85 ~ 265 V AC / 110 ~ 370 V DC

N301

N302

N302
301

Features

- Trip starting indicator
- Detection of no connection to current transformer for extra safety
- Relay tripped indicator
- High immunity to electrical interference
- Earth leakage level indicators

Features for N302 only

- Safety output contact
- Earth leakage level indicators

Technical Data

AUXILIARY SUPPLY

Model N301/302 -240AD	: 85 ~ 265 V AC/ 110 ~ 370V DC
Rated frequency	: 50 / 60 Hz
VA rating	: 3 VA typical

SETTING RANGES

Sensitivity adjustment	: 0.03 A to 30 A
Delay time adjustment	: 0 sec to 3.0 sec

PERFORMANCE

Setting accuracy	: -15% to +0%
Timing accuracy	: ±5%

OUTPUT CONTACTS

Contact arrangement	: 2 x manual reset type : NC and NO contacts available
Rated voltage	: 250 V AC
Contact rating	: 5 A
Expected electrical life	: 100,000 operations at rated current
Expected mechanical life	: 5 x 10^6 operations

INDICATORS

Auxiliary supply	: Green indicator
Time delay	: Red indicator
Trip	: Red indicator
Real-time leakage current	: Red in dicator

ZERO-PHASE CURRENT TRANSFORMER

To operate with Mikro's ZCT series of current transformer

ENVIRONMENTAL CONDITIONS

Temperature	: -10°C to 55°C
Humidity	: 5% to 95%, non-condensing

MECHANICAL

Mounting	: Panel mounting
Dimension (mm)	: 72(w) x 72(h) x 97(d)
Enclosure protection	: IP40 at panel
Approximate weight	: 0.3kg (excluding ZCT)

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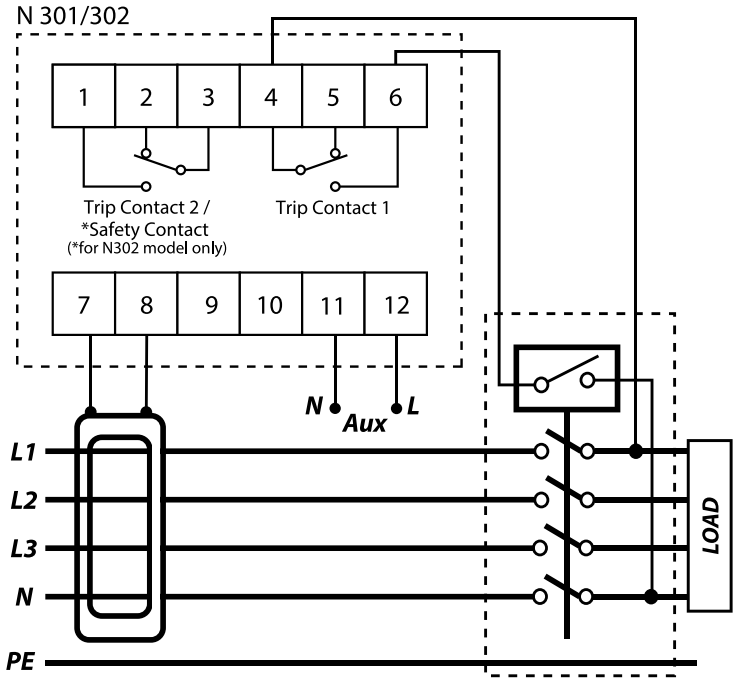
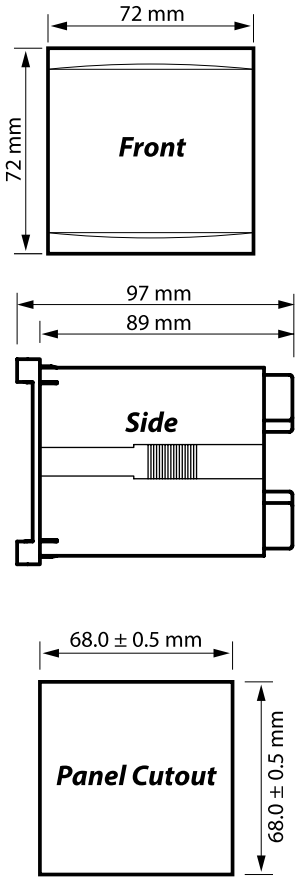
Typical Application Diagram



(The EARTH wire must not pass through the ZCT)

Case Dimensions



Ordering Information

MODEL	DESCRIPTION
N301 - 240AD	For 50 Hz system, auxiliary voltage 85 ~ 265 V AC / 110 ~ 370 V DC
N302 - 240AD	For 50 Hz system, auxiliary voltage 85 ~ 265 V AC / 110 ~ 370 V DC
N301 - 240AD6	For 60 Hz system, auxiliary voltage 85 ~ 265 V AC / 110 ~ 370 V DC
N302 - 240AD6	For 60 Hz system, auxiliary voltage 85 ~ 265 V AC / 110 ~ 370 V DC

NX 300A

NX 300EA

NX300A 300EA

Features for NX 300A / 300EA

- Numerical earth leakage relay
- Programmable current sensitivity and time delay
- Detection of no connection to ZCT
- Relay trip indicator
- Relay alarm indicator
- Real-time leakage current display
- 50% pre-fault indicator
- Leakage fault current recording
- Standard DIN 96x96mm panel mounting
- Protected against nuisance tripping

Features for NX 300EA only

- Positive safety output contact
- Pre-fault alarm contact
- Remote reset function

Technical Data

AUXILIARY SUPPLY

Model NX300A / 300EA -230A	: 184 ~ 276 V AC
Model NX300A / 300EA -110A	: 94 ~ 127 V AC
Rated frequency	: 50 Hz
VA rating	: 3 VA typical

SETTING

Sensitivity adjustment	: 30mA, 50mA, 0.10~1.00A(Step=50mA) 1.00~10.0A (Step=1.00A)
Time delay adjustment	: Instantaneous, 0.1~3.0sec (Step=0.1s)

PERFORMANCE

Setting accuracy	: -15% to +0%
Timing accuracy	: ±5%

RECORD

Fault record	: 3 latest tripped fault currents or "tSt" for manual test trip
Storage	: Non-volatile memory

INPUT

Remote Reset	: N.O. dry contact *

OUTPUTS

Trip contact	: Activated during leakage trip, manual test trip or ZCT connection error
Positive safety contact*	: Activated when powerup and relay function correctly
Alarm contact*	: Activated when measured leakage current exceeded 50% of IΔn.

OUTPUT CONTACTS

Rated voltage	: 240 V AC
Contact rating	: 5 A
Expected electrical life	: 100,000 operations at rated current
Expected mechanical life	: 5 x 10^6 operations

INDICATORS

Pre-fault alarm	: Red indicator (Normal blink)
Time delay	: Red indicator (Fast blink)
Leakage trip	: 7-segment display and red indicator
ZCT connection error	: 7-segment display and red indicator
Real-time leakage current	: 7-segment display

ZERO-PHASE CURRENT TRANSFORMER

To operate with Mikro's ZCT series of current transformer

ENVIRONMENTAL CONDITIONS

Temperature	: -10°C to 55°C
Humidity	: 5% to 95%, non-condensing

MECHANICAL

Mounting	: Panel mounting
Dimension (mm)	: 96(w) x 96(h) x 90(d)
Enclosure protection	: IP54 at the panel
Approximate weight	: 0.4 kg (excluding ZCT)

**Applicable to NX300EA series only*

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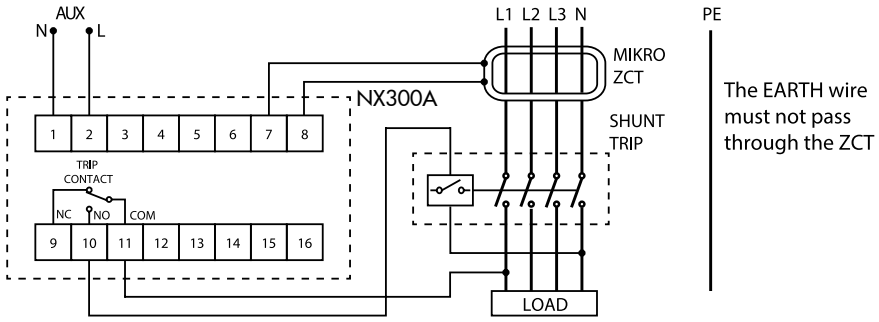
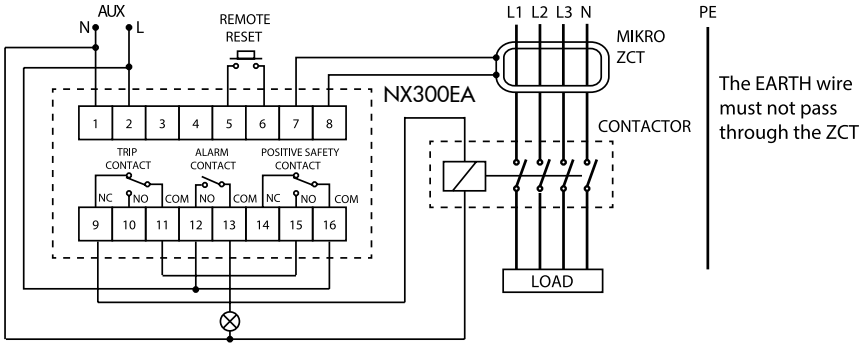
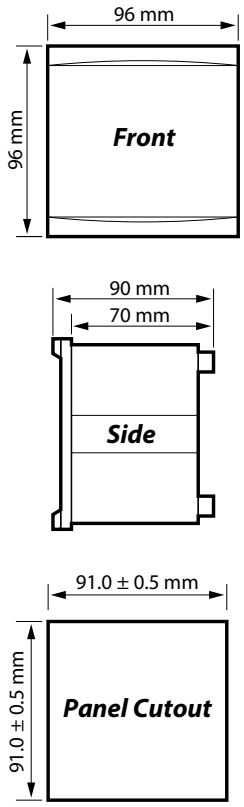
Typical Application Diagram For NX 300A



Typical Application Diagram For NX 300EA



Case Dimensions



Ordering Information

MODEL	DESCRIPTION
NX300A - 240AD	For 50Hz system, auxiliary voltage 85~265 V AC or 110~340 V DC
NX300EA - 240AD	For 50Hz system, auxiliary voltage 85~265 V AC or 110~340 V DC
NX300A - 230A	For 50Hz system, auxiliary voltage 184~276 V AC
NX300EA - 230A	For 50Hz system, auxiliary voltage 184~276 V AC
NX300A - 110A	For 50Hz system, auxiliary voltage 94~127 V AC
NX300EA - 110A	For 50Hz system, auxiliary voltage 94~127 V AC
NX300A - 240AD6	For 60Hz system, auxiliary voltage 85~265 V AC or 110~340 V DC
NX300EA - 240AD6	For 60Hz system, auxiliary voltage 85~265 V AC or 110~340 V DC
NX300A - 230A6	For 60Hz system, auxiliary voltage 184~276 V AC
NX300EA - 230A6	For 60Hz system, auxiliary voltage 184~276 V AC
NX300A - 110A6	For 60Hz system, auxiliary voltage 94~127 V AC
NX300EA - 110A6	For 60Hz system, auxiliary voltage 94~127 V AC

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Earth Leakage Relay

NX330A

Features

- Numerical earth leakage relay
- Incorporated positive safety feature into trip contact
- One programmable contact for flexibility
- Detection of no connection to ZCT
- Relay trip / alarm indicator
- Real-time leakage current display
- Leakage fault current recording
- Remote reset function
- Standard DIN 96x96mm panel mounting
- Protected against nuisance tripping

Technical Data

AUXILIARY SUPPLY

Model NX330A-230A : 184~276 V AC
Model NX330A-110A : 94~127 V AC
Rated frequency : 50Hz
VA rating : 3VA typical

PERFORMANCE

Setting accuracy : -15% to +0%
Timing accuracy : ±5%

SETTING

Sensitivity adjustment : 30mA, 50mA, 0.10~1.00A (Step=50mA) 1.00~10.0A (Step=1.00A)

Time delay adjustment : Instantaneous, 0.1~3.0sec (Step=0.1s)

Number of shots : 0~30 (Step=1, 0=Disable auto re-close function)

Dead time : 1~500sec (Step=1sec)
Persistent fault time : 0~500sec (Step=1sec, 0=Disable function)

Reclaim time : 0~500min (Step=1min, 0=Disable function)

Lockout auto reset time : 0~200hour (Step=1Hr, 0=Disable function)

Programmable contact : Option 0 = Disable
Option 1 = All (Option 2 to 6)
Option 2 = ZCT error
Option 3 = Leakage trip, test trip, re-close lockout
Option 4 = Re-close lockout
Option 5 = Pre-fault alarm, leakage trip, test trip, re-close lockout
Option 6 = Re-close lockout, ZCT error

RECORD

Fault record : 3 latest tripped fault currents or "tSt" for manual test trip
Storage : Non-volatile memory

INPUT

Remote reset : N.O. dry contact

OUTPUTS

Trip safe contact : Activated when the relay is in normal power-up condition with the measured leakage current less than 0.85 IΔn.
Programmable contact : Activated according to user setting

OUTPUT CONTACTS

Rated voltage : 250 V AC
Contact rating : 5 A (NO)
3 A (NC)
Expected electrical life : 100,000 operations at rated current
Expected mechanical life: 5 x 10^6 operations

INDICATORS

Pre-fault alarm : Red indicator (Normal blink)
Time delay : Red indicator (Fast blink)
Leakage trip : 7-segment display and red indicator
Re-close lockout : 7-segment display and red indicator
ZCT connection error : 7-segment display and red indicator
Real-time leakage current: 7-segment display

ZERO-PHASE CURRENT TRANSFORMER

To operate with Mikro's ZCT series of current transformer

ENVIRONMENTAL CONDITIONS

Temperature : -10°C to 55°C
Humidity : 5% to 95%, non-condensing

MECHANICAL

Mounting : Panel mounting
Dimension (mm) : 96(w) x 96(h) x 90(d)
Enclosure protection : IP54 at the panel
Approximate weight : 0.6 kg (excluding ZCT)

NX 330A

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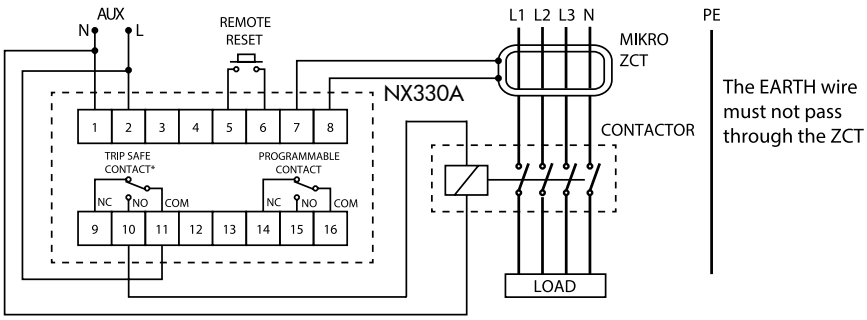
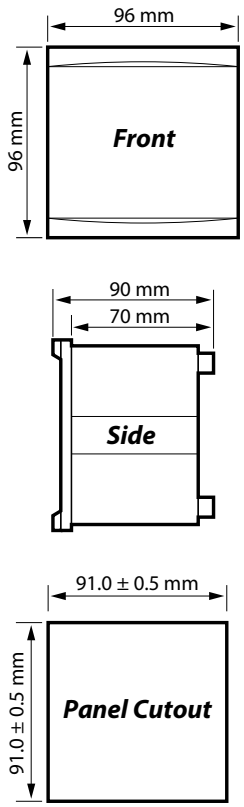
Typical Application Diagram



* The trip safe contact is activated (terminal 10-11 closed) when the relay is in normal power-up condition with the measured leakage current less than 0.85 IΔn.

Case Dimensions



Ordering Information

MODEL	DESCRIPTION
NX330A-230A	For 50Hz system, auxiliary voltage 184~276 V AC
NX330A-110A	For 50Hz system, auxiliary voltage 94~127 V AC
NX330A-230A6	For 60Hz system, auxiliary voltage 184~276 V AC
NX330A-110A6	For 60Hz system, auxiliary voltage 94~127 V AC

NX302A 301A 301E

Features

- Trip starting indicator
- Detection of no connection to current transformer for extra safety
- Relay tripped indicator
- High immunity to electrical interference

Features for NX 302A only

- Safety output contact
- Earth leakage level indicators
- Remote reset and remote test functions

Technical Data

AUXILIARY SUPPLY

Model NX301A / 302A -240A	: 198 ~ 265 V AC
Model NX301A / 301E -110A	: 94 ~ 127 V AC
Rated frequency	: 50 / 60 Hz
VA rating	: 3 VA typical

SETTING RANGES

Sensitivity adjustment	: 0.03 A to 30 A
Delay time adjustment	: 0 sec to 3.0 sec

PERFORMANCE

Setting accuracy	: -15% to +0%
Timing accuracy	: ±5%

OUTPUT CONTACTS

Contact arrangement	: 1 x manual reset type : 1 x safety contact* : NC and NO contacts available
Rated voltage	: 250 V AC
Contact rating	: 5 A
Expected electrical life	: 100,000 operations at rated current
Expected mechanical life	: 5 x 10^6 operations

INPUTS

Remote Test* / Reset Inputs*: N.O. dry contact

INDICATORS

Auxiliary supply	: Green indicator
Time delay	: Red indicator
Trip	: Red indicator
Real-time leakage current	: Red indicator

ZERO-PHASE CURRENT TRANSFORMER

To operate with Mikro's ZCT series of current transformer

ENVIRONMENTAL CONDITIONS

Temperature	: -10°C to 55°C
Humidity	: 5% to 95%, non-condensing

MECHANICAL

Mounting	: Panel mounting
Dimension (mm)	: 96(w) x 96(h) x 90(d)
Approximate weight	: 0.4 kg (excluding ZCT)

** Applicable to NX302A series only*
*** Applicable to NX301E series only*

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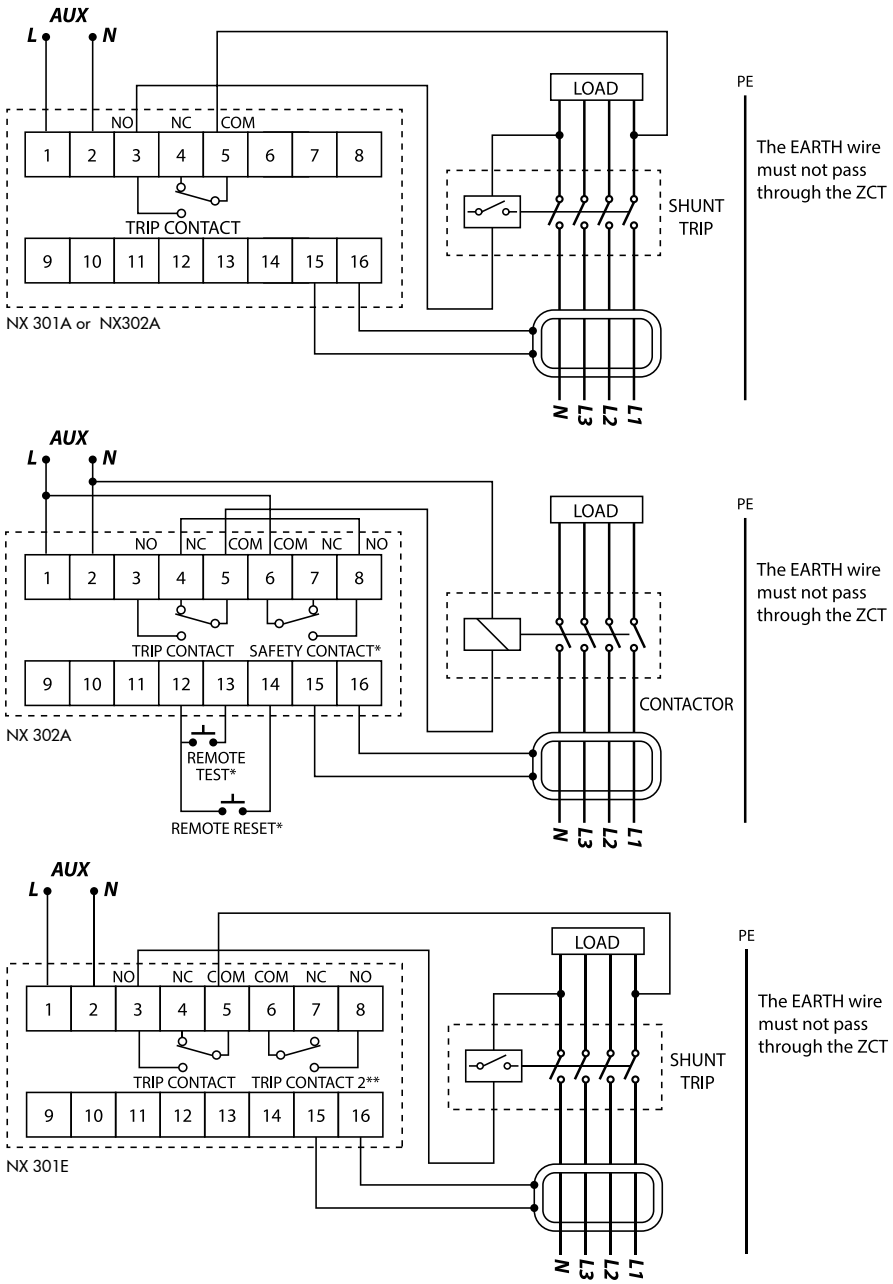
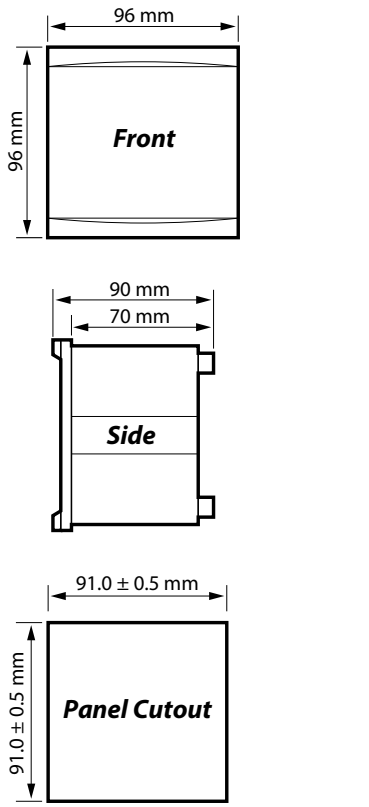
Typical Application Diagram



Case Dimensions



Ordering Information

MODEL	DESCRIPTION
NX301A - 240A	For 50 Hz system, auxiliary voltage 198 ~ 265 V AC
NX301A - 110A	For 50 Hz system, auxiliary voltage 94 ~ 127 V AC
NX302A - 240A	For 50 Hz system, auxiliary voltage 198 ~ 265 V AC
NX302A -110A	For 50 Hz system, auxiliary voltage 94 ~ 127 V AC
NX301E - 240A	For 50 Hz system, auxiliary voltage 198 ~ 265 V AC
NX301E -110A	For 50 Hz system, auxiliary voltage 94 ~ 127 V AC
NX301A - 240A6	For 60 Hz system, auxiliary voltage 198 ~ 265 V AC
NX301A - 110A6	For 60 Hz system, auxiliary voltage 94 ~ 127 V AC
NX302A - 240A6	For 60 Hz system, auxiliary voltage 198 ~ 265 V AC
NX302A -110A6	For 60 Hz system, auxiliary voltage 94 ~ 127 V AC
NX301E - 240A6	For 60 Hz system, auxiliary voltage 198 ~ 265 V AC
NX301E -110A6	For 60 Hz system, auxiliary voltage 94 ~ 127 V AC

DIN330

Features

- Numerical auto-reclosing earth leakage relay
- Incorporated positive safety feature into trip contact
- Detection of no connection to ZCT
- Relay trip / alarm indicator
- Real-time leakage current display
- Leakage fault current recording
- Remote reset function
- Standard 35mm DIN rail mounting
- Protected against nuisance tripping

Technical Data

AUXILIARY SUPPLY
Model DIN330-230 A(6) : 184 ~ 276 V AC
Rated frequency : 50 or 60 Hz
VA rating : 3 VA typical

PERFORMANCE
Setting accuracy : -15% to +0%
Timing accuracy : ±5%

SETTING
Sensitivity adjustment : 30 mA, 50 mA, 0.10 A –1.00 A (Step = 50 mA), 1.00 A – 10.0 A (Step = 1.00 A)
Time delay adjustment: Instantaneous, 0.1s – 3.0s Step = 0.10 sec.
Number of shots : 0 - 30. Step = 1. 0 = Disable auto reclose function
Dead time : 1 - 500 sec. Step = 1 sec.
Permanent fault time : 0 - 500 sec. Step = 1 sec. 0 = Disable function
Reclaim time : 0 - 500 minute Step = 1 min 0 = Disable function
Lockout auto reset time: 0 - 200 hour Step = 1 Hrs 0 = Disable function

Programmable contact : Option 0 = Disable
Option 1 = All(Option 2 to 6)
Option 2 = ZCT error
Option 3 = Leakage trip, test trip, re-close lockout
Option 4 = Re-close lockout
Option 5 = Pre-fault alarm, leakage trip, test trip, reclose lockout
Option 6 = Re-close lockout, ZCT error

RECORD
Fault record : 3 latest tripped fault currents or “tSt” for manual test trip
Storage : Non-volatile memory

INPUT
Remote reset : N.O. dry contact

OUTPUTS
Trip safe contact : Activated when the relay is in normal power-up condition with the measured leakage current less than 0.85 $I\Delta_n$.
Programmable contact: Activated according to user setting

OUTPUT CONTACTS
Rated voltage : 250 V AC
Contact rating : 5 A (NO) 3 A (NC)
Expected electrical life : 100,000 operations at rated current
Expected mechanical life : 5 x 10^6 operations

INDICATORS
50% pre-fault alarm : Red indicator (Normal blink)
Time delay : Red indicator (Fast blink)
Leakage trip : 7-segment display and red indicator
Reclose lockout : 7-segment display and red indicator
ZCT fault : 7-segment display and red indicator
Real time leakage current : 7-segment display

ZERO - PHASE CURRENT TRANSFORMER
To operate with Mikro’s ZCT series of current transformer

ENVIRONMENTAL CONDITIONS
Temperature : -10°C to 55°C
Humidity : 5% to 95%, non-condensing

MECHANICAL
Mounting : DIN rail mounting
Dimension (mm) : 71(w) x 85(h) x 70(d)
Approximate weight : 0.4 kg (excluding ZCT)

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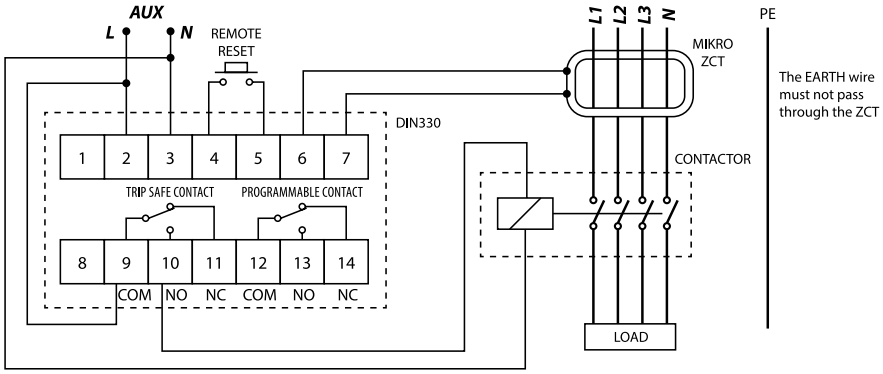
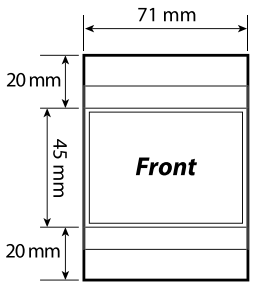
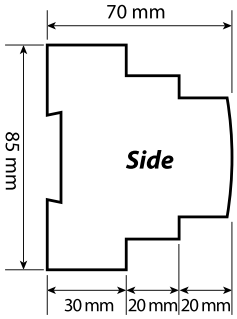
Typical Application Diagram



* The trip safe contact is activated (terminal 9-10 closed) when the relay is in normal power-up condition with the measured leakage current less than 0.85 IDn.

Case Dimensions





Ordering Information

MODEL	DESCRIPTION
DIN330 - 230 A	For 50 Hz system, auxiliary voltage 230 V AC
DIN330 - 230 A6	For 60 Hz system, auxiliary voltage 230 V AC

DIN 310
310E

Features

- Numerical earth leakage relay
- Programmable current sensitivity and time delay
- Detection of no connection to ZCT
- Relay trip indicator
- Relay alarm indicator
- Real-time leakage current display
- Leakage fault current recording
- 50% pre-fault indicator
- Standard DIN rail mounting
- Protected against nuisance tripping

Features for DIN 310E only

- Positive safety output contact
- 50% pre-fault output contact
- Remote reset function

Technical Data

AUXILIARY SUPPLY

DIN310-230 A(6)	: 184 ~ 276 V AC
DIN310E-230 A(6)	: 184 ~ 276 V AC
Rated frequency	: 50 or 60 Hz
VA rating	: 3 VA typical

PERFORMANCE

Setting accuracy	: -15% to +0%
Timing accuracy	: ±5%

SETTING

Sensitivity adjustment	: 30mA, 50mA, 0.10~1.00A (Step=50mA) 1.00~10.0A (Step=1.00A)
Time delay adjustment	: Instantaneous, 0.1~3.0sec Step=0.10 sec

OUTPUT CONTACTS

Rated voltage	: 250 V AC
Contact rating	: 5 A (NO) 3 A (NC)
Expected electrical life	: 100,000 operations at rated current
Expected mechanical life	: 5 x 10^6 operations

RECORD

Fault record	: 3 latest tripped fault currents or "tSt" for manual test trip
Storage	: Non-volatile memory

INPUT

Remote reset*	: N.O. dry contact

OUTPUTS

Trip Contact	: Activated if relay tripped or ZCT fault
Positive safety contact*	: Activated when ZCT is connected properly to the relay
Pre-fault alarm contact*	: Activated when leakage current exceeded 50% of sensitivity setting

INDICATORS

50% pre-fault alarm	: Red indicator
Time delay	: Red indicator
Leakage trip	: 7-segment display and red indicator
ZCT fault	: 7-segment display and red indicator
Real time leakage current	: 7-segment display

ZERO-PHASE CURRENT TRANSFORMER

To operate with Mikro's ZCT series of current transformer

ENVIRONMENTAL CONDITIONS

Temperature	: -5˚C to +55˚C
Humidity	: 56 days at 93% RH and 40˚C non-condensing

MECHANICAL

Mounting	: DIN rail mounting
Dimension (mm)	: 71(w) x 85(h) x 70(d)
Approximate weight	: 0.4 kg (excluding ZCT)

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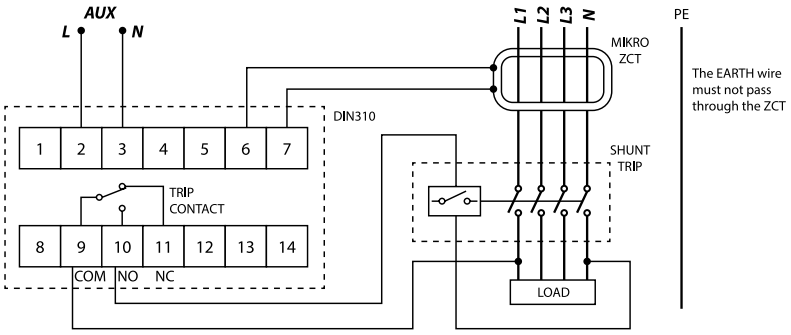
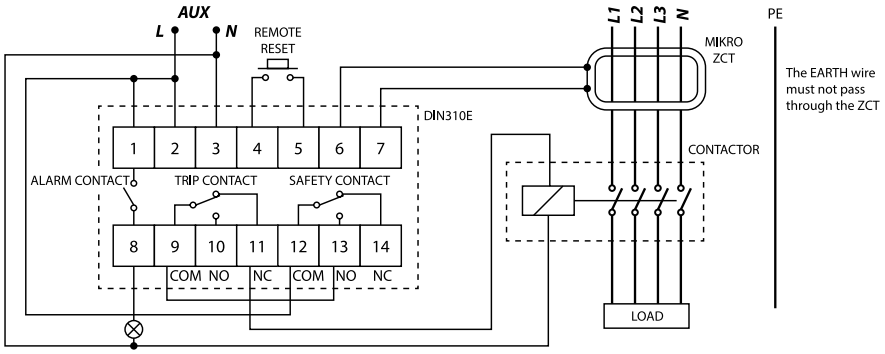
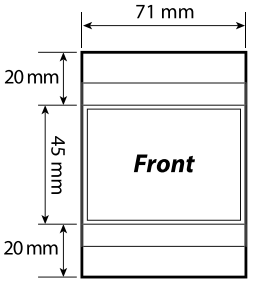
Typical Application Diagram For DIN 310

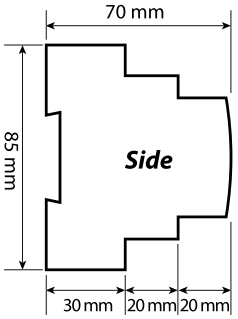


Typical Application Diagram For DIN 310E



Case Dimensions





Ordering Information

MODEL	DESCRIPTION
DIN310 - 230 A	For 50 Hz system, auxiliary voltage 230 V AC
DIN310E - 230 A	For 50 Hz system, auxiliary voltage 230 V AC
DIN310 - 230 A6	For 60 Hz system, auxiliary voltage 230 V AC
DIN310E - 230 A6	For 60 Hz system, auxiliary voltage 230 V AC

* 60Hz system, auxiliary voltage 110V AC model available upon special request.

DIN300
300E

Features

- 25 selectable sensitivity settings: 30 mA to 30 A
- 9 selectable time delays: 0 to 3s
- Earth leakage level indicators
- Detection of no connection to ZCT
- Relay tripped indicator
- Trip starting indicator
- Protected against nuisance tripping

Features For DIN 300E only

- 50% pre-fault output contact
- Remote test and remote reset functions

Technical Data

AUXILIARY SUPPLY

Model DIN300 / 300E -240A	: 198 ~ 265 V AC
Model DIN300 / 300E -110A	: 94 ~ 127 V AC
Rated frequency	: 50 / 60 Hz
VA rating	: 3 VA typical

SETTING RANGES

Sensitivity setting	: 30 mA, 50 mA, 75 mA, 100 mA, 125 mA, 150 mA, 200 mA, 250 mA, 300 mA, 500 mA, 750 mA, 1 A, 1.25 A, 1.5 A, 2 A, 2.5 A, 3 A, 5 A, 7.5 A, 10 A, 12.5 A, 15 A, 20 A, 25 A, 30 A.
Time delay setting	: Instantaneous, 50 ms, 100 ms, 150 ms, 250 ms, 350 ms, 500 ms, 1 s, 3 s.

PERFORMANCE

Setting accuracy	: -15% to +0%
Timing accuracy	: ±5%

OUTPUT CONTACTS

Contacts (Trip / 50% pre-fault*)	
Rated voltage	: 250 V AC
Contact rating	: 5 A
Expected electrical life	: 100,000 operations at rated current
Expected mechanical life	: 5 x 10^6 operations

INPUT

Remote test* / Reset inputs*: N.O. dry contacts

ZERO-PHASE CURRENT TRANSFORMER

To operate with Mikro's ZCT series of current transformer

INDICATORS

Auxiliary supply : Green indicator
Time delay : Red indicator
Trip : Red indicator
Leakage current* : 5 red indicators for leakage levels

ENVIRONMENTAL CONDITIONS

Temperature	: -10°C to 55°C
Humidity	: 5% to 95%, non-condensing

MECHANICAL

Mounting	: DIN rail mounting
Dimension (mm)	: 71(w) x 85(h) x 70(d)
Approximate weight	: 0.4 kg (excluding ZCT)

* Applicable to DIN300E model only

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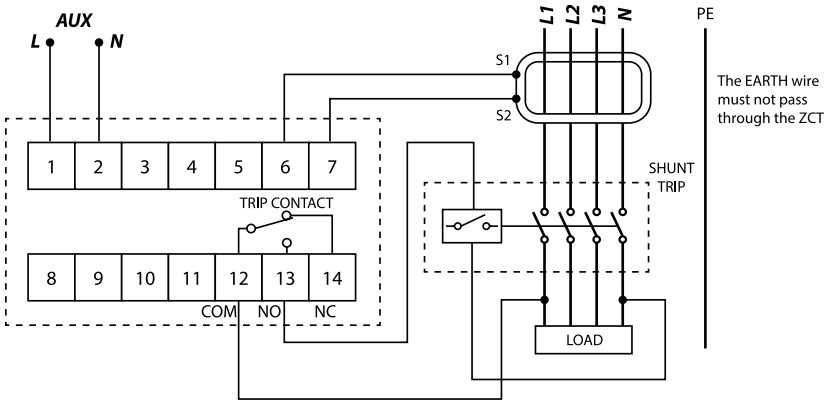
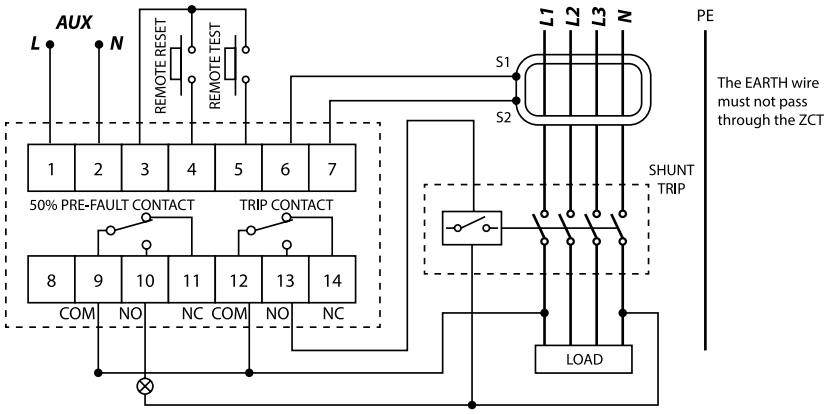
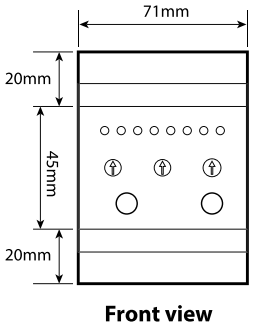
Typical Application Diagram For DIN 300



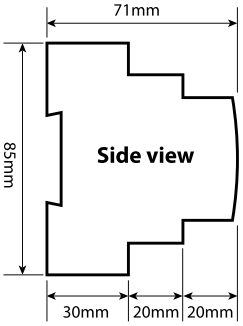
Typical Application Diagram For DIN 300E



Case Dimensions



Front view



Ordering Information

MODEL	DESCRIPTION
DIN300 - 240A	For 50 Hz system, auxiliary voltage 240 V AC
DIN300 - 110A	For 50 Hz system, auxiliary voltage 110 V AC
DIN300E - 240A	For 50 Hz system, auxiliary voltage 240 V AC
DIN300E - 110A	For 50 Hz system, auxiliary voltage 110 V AC
DIN300 - 240A6	For 60 Hz system, auxiliary voltage 240 V AC
DIN300 - 110A6	For 60 Hz system, auxiliary voltage 110 V AC
DIN300E - 240A6	For 60 Hz system, auxiliary voltage 240 V AC
DIN300E - 110A6	For 60 Hz system, auxiliary voltage 110 V AC

ZCT 40S 60S 80S 120 210S


40S

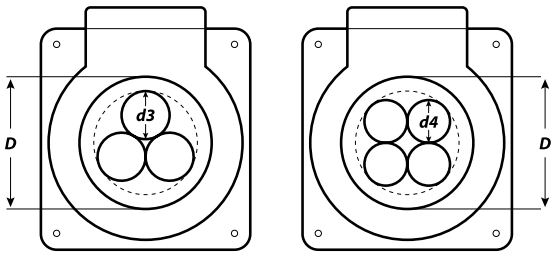

60S


80S


120S


210S

Calculation to determine Inner Diameter of ZCT required

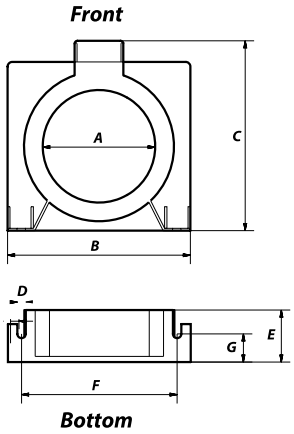


3 wire *4 wire*

MODEL	D ZCT inner diameter (mm)	d3, 3wire Up till wire diameter (mm)	d4, 4wire Up till wire diameter (mm)
ZCT 40S	40	14	12
ZCT 60S	60	23	21
ZCT 80S	80	32	29
ZCT 120S	120	51	46
ZCT 210S	210	93	83

Example:
For a single core CU / PVC insulated, non-sheathed 450 / 750 V 50mm² conductor, it's nominal overall diameter is 11.7mm. To pass 4 wires through the ZCT, we can use ZCT40S as the maximum diameter it can support is up till 12mm.

Case Dimensions



DIMENSION (mm)	ZCT Model 40S	60S	80S	120S	210S
A	40	60	80	120	210
B	89	105	130	180	310
C	94	110	135	195	311
D	6	6	6	6	6
E	37	37	37	37	37
F	75	87	112	159	292
G	27	27	27	27	18

Ordering Information

MODEL	DESCTRIPTION	WEIGHT
ZCT40S	40mm inner diameter	0.16 kg
ZCT60S	60mm inner diameter	0.20 kg
ZCT80S	80mm inner diameter	0.28 kg
ZCT120S	120mm inner diameter	0.57 kg
ZCT210S	210mm inner diameter	1.5 kg

Earth Leakage Relay

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Digital Power Meter

DPM 680 680B

Features

Measurement Parameters:

- Phase & Line Voltages (L-N, Max. and Min.)
- Phase Current & Neutral Current (Max. and Min.)
- Bidirectional kW, kVAR & kVA
- Bidirectional kWh, kVARh & kVAh
- Frequency
- Total & Displacement Power Factor
- Voltage Total Harmonic Distortion
- Current Total Harmonic Distortion
- Avg. and Max. Thermal Current Demand
- Avg. and Max. Power (kW, kVA, kVAR) Demand
- Current Sequence Components
- Voltage Sequence Components

TFT Colour LCD Display
Serial RS-485 Modbus RTU
Modbus TCP/IP
Built-in Webserver
Voltage & Current Waveform Display
Voltage & Current Harmonics Display

Technical Data

WIRING SYSTEMS
3-phase 4-wire system
3-phase 3-wire system

CURRENT MEASUREMENT (TRMS)
Nominal current : 5 A
Min. measurement : 5 mA
Accuracy : 0.2% of full scale
Burden : < 0.05 VA at 5 A
Measurement range : 10 A
Pulsed withstand : 100 A for 1 sec
CT primary : 5 ~ 50,000 A

VOLTAGE MEASUREMENT (TRMS)
Nominal phase voltage : 0 ~ 300 V AC
Minimum measurement : 10 V
Accuracy : 0.2% at full scale
Phase voltage via VT : 60 ~ 50,000 V

POWER MEASUREMENT
Real power, apparent power, reactive power
Accuracy : 0.5%

POWER FACTOR MEASUREMENT
Total and displacement power factor
Accuracy : 0.5%

POWER & THERMAL CURRENT DEMAND
Interval : 1 ~ 30 mins

VOLTAGE AND CURRENT SEQUENCE COMPONENTS
Positive, negative and zero sequence

FREQUENCY MEASUREMENT
Measurement range : 45 ~ 65 Hz
Accuracy : 0.2%

ENERGY MEASUREMENT ACCURACY
Active : IEC 62053-22 class 0.5
Reactive : IEC 62053-23 class 2

HARMONICS DISPLAY
Fundamental up to 32nd order

VOLTAGE & CURRENT WAVEFORM DISPLAY
Simultaneous 3-phase voltage or current waveforms

COMMUNICATION
Protocol : Modbus RTU
Interface : Isolated RS485
Protocol : Modbus TCP/IP
Interface : Ethernet 10M/100M BaseT
Protocol : HTTP Server
Interface : Ethernet 10M/100M BaseT

AUXILIARY POWER SUPPLY
AC voltage : 90 ~ 415 V AC
Frequency : 50 / 60 Hz
DC voltage : 100 ~ 300 V DC
Power consumption : 3W typical
Sustained overload : 500 V AC

ENVIRONMENTAL CONDITIONS
Overvoltage category : IV
Pollution degree : 2
Temperature : -10°C to 55°C
Humidity : 5% to 95%, non-condensing

MECHANICAL
Mounting : According to DIN 43700 / ANSI C39.1
Dimension (mm) : 96(w) x 96(h) x 100(d)
Enclosure protection : IP63 at the panel IP20 at the body
Approximate weight : 0.5 kg

DPM 680

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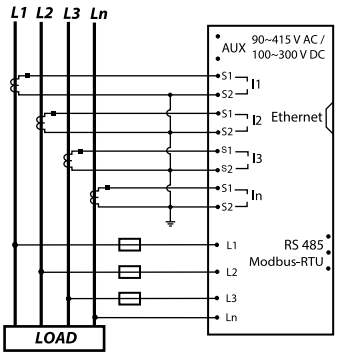
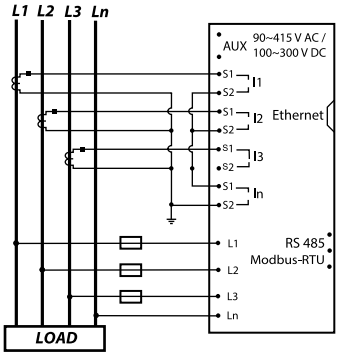
Typical Application Diagrams

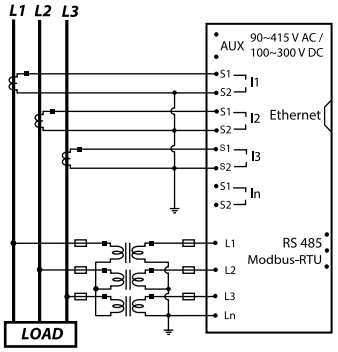
3-PHASE 4-WIRE SYSTEM : 4 CTs, Direct V Input



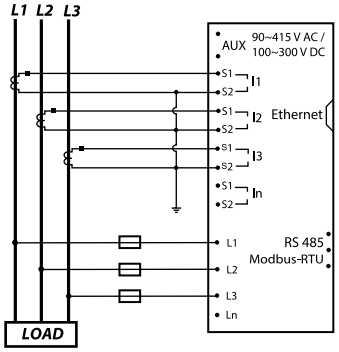
3-PHASE 4-WIRE SYSTEM : 3 CTs, Direct V Input



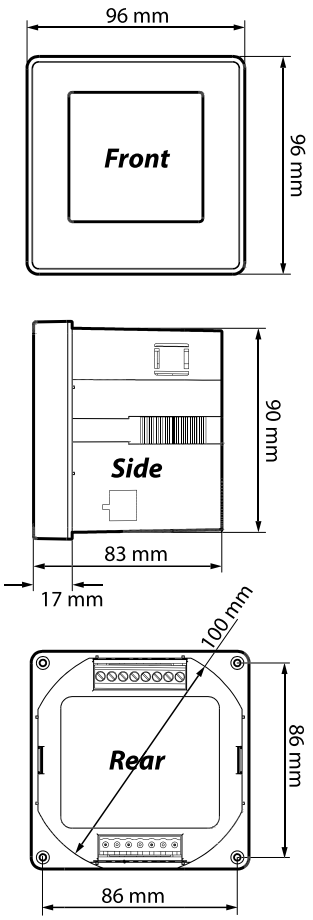
3-PHASE 3-WIRE SYSTEM : 3 CTs, 3 VTs



3-PHASE 3-WIRE SYSTEM : 3 CTs, Direct V Input



Case Dimensions

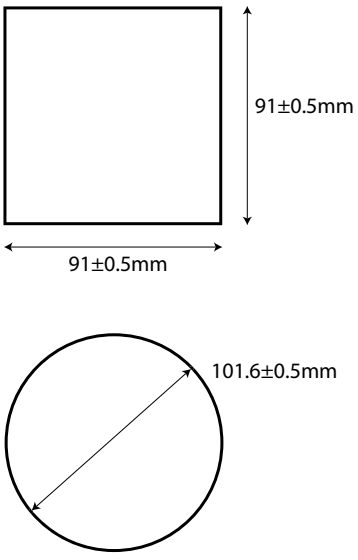


Test Standards

IEC 61010-1
Safety requirements.

IEC 61326-1
EMC requirements.

Cut-Out Recommendations



Ordering Information

MODEL	DESCRIPTION
DPM 680-415AD	Auxiliary Voltage 90 ~ 415 V AC or 100 ~ 300 V DC, with Modbus TCP/IP and Modbus RS485
DPM 680B-415AD	Auxiliary Voltage 90 ~ 415 V AC or 100 ~ 300 V DC, with Modbus RS485

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Digital Power Meter

DPM380
380B

Features

LCD display with back lighting

Modbus-RTU communication

(for DPM380 only)

MEASUREMENT PARAMETERS:

- Phase Voltage (L-N)
- Line Voltage (L-L)
- Phase Current and Neutral Current
- Bidirectional kW (per phase & total)
- Bidirectional kVAR (per phase & total)
- Bidirectional kVA (per phase & total)
- Frequency
- Power Factor (per phase & total)
- Energy (+ and -) for kWh, kVARh and kVAh
- THD Phase Voltage (L-N)
- THD Phase Current
- Active Power (kW) Demand
- Maximum Active Power (kW) Demand

Technical Data

DISPLAY TYPE
LCD display

MEASUREMENTS
3-phase 4-wire system
3-phase 3-wire system

CURRENT MEASUREMENT (TRMS)

CT primary	: 5 ~ 8000 A
CT secondary	: 5 A
Minimum measurement	: 5 mA
Accuracy	: 0.5% from 1A to 6 A (secondary)
Burden	: < 0.05 VA at 5 A
Sustained overload	: 6 A

VOLTAGE MEASUREMENT (TRMS)

Nominal phase voltage	: 20 ~ 300 V AC
Minimum measurement	: 10 V
Accuracy	: 0.5% at full scale
Phase voltage via VT	: 60 ~ 33,000 V

POWER MEASUREMENT
Real power, apparent power, reactive power measurement

Measuring updating period	: 1 s
Accuracy	: 1.0%

ACTIVE POWER DEMAND

Interval	: 1 ~ 30 mins

POWER FACTOR MEASUREMENT
Total and displacement power factor

Accuracy	: 1.0%

FREQUENCY MEASUREMENT

Measurement range	: 45 ~ 65 Hz
Measurement updating period	: 1s
Accuracy	: 0.5%

ENERGY ACCURACY

Active (according to IEC 62053-21)	: class 1
Reactive (according to IEC 62053-23)	: class 2

AUXILIARY POWER SUPPLY

AC voltage	: 90 ~ 415 V AC
Frequency	: 50 / 60 Hz
DC voltage	: 100 ~ 300 V DC
Power consumption	: <3 VA

COMMUNICATION

Hardware interface	: Isolated RS485
Protocol	: Modbus-RTU
Baud rate	: 2400, 4800, 9600, 19200, 38400

ENVIRONMENTAL CONDITIONS

Temperature	: -10°C to 55°C
Humidity	: 5% to 95%, non-condensing

MECHANICAL

Mounting	: Panel mounting
Dimension (mm)	: 96(w) x 96(h) x 100(d)
Approximate weight	: 0.5 kg
Enclosure protection	: IP54 at the panel IP20 at the body

DPM 380 / 380B

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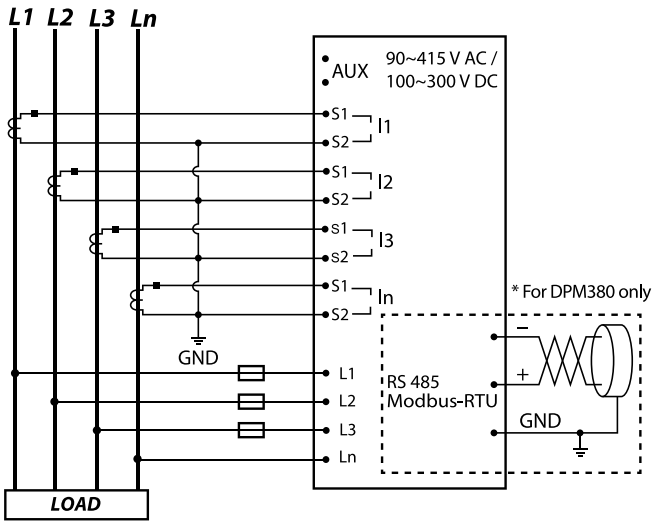
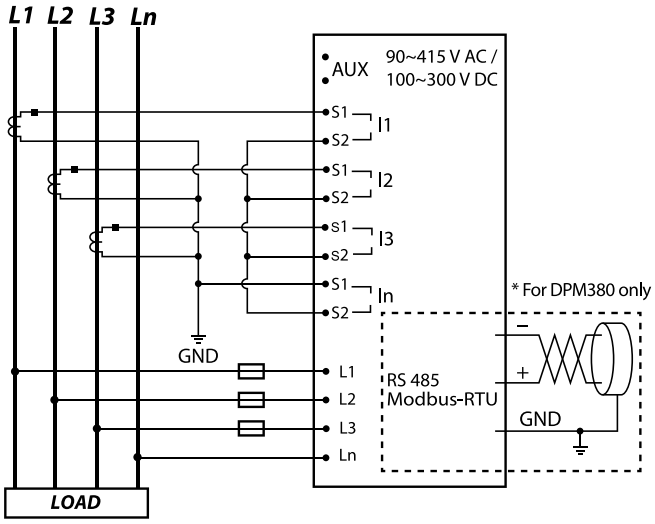
Typical Application Diagram

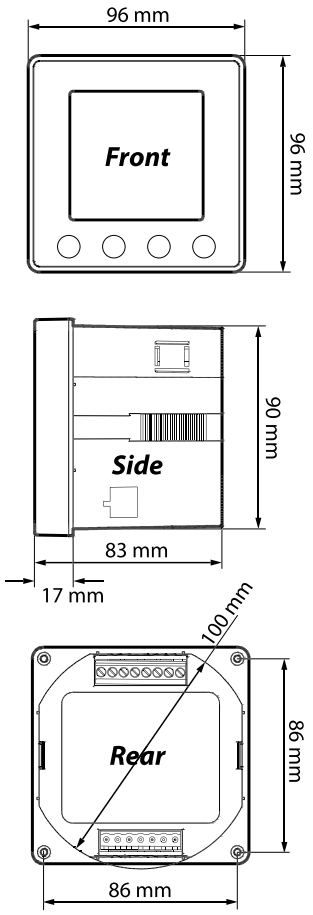
3-PHASE 4-WIRE SYSTEM WITH 4 CTs CONNECTION



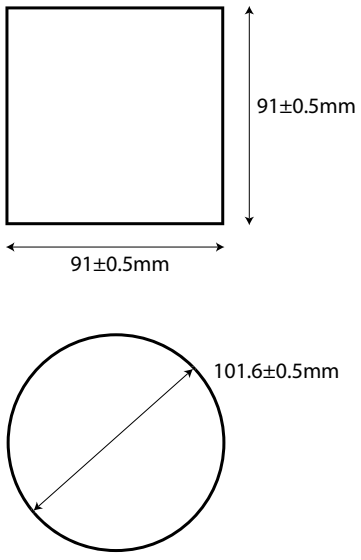
3-PHASE 4-WIRE SYSTEM WITH 3 CTs CONNECTION



Case Dimensions



Cut-Out Recommendations



Electromagnetic Compatibility (EMC)

Part 6-2: Generic Standards IEC61000-6-2
Immunity for industrial environments.

Part 6-4: Generic Standards IEC61000-6-4
Emission standard for industrial environments.

Ordering Information

MODEL	DESCRIPTION
DPM 380-415AD	Auxiliary Voltage 90 ~ 415 V AC or 100 ~ 300 V DC, with RS 485
DPM 380B-415AD	Auxiliary Voltage 90 ~ 415 V AC or 100 ~ 300 V DC

DM38

Features

LCD display with back lighting

Modbus-RTU communication

DIN rail type

MEASUREMENT PARAMETERS:

- Phase Voltage (L-N)
- Line Voltage (L-L)
- Phase Current
- Bidirectional kW (per phase & total)
- Bidirectional kVAR (per phase & total)
- Bidirectional kVA (per phase & total)
- Frequency
- Power Factor (per phase & total)
- Energy (+ and -) for kWh, kVARh and kVAh
- THD Phase Voltage (L-N)
- THD Phase Current

Technical Data

DISPLAY TYPE
LCD display

MEASUREMENTS
3-phase 4-wire system

CURRENT MEASUREMENT (TRMS)

CT primary	:5 ~ 8000 A
CT secondary	:5 A
Minimum measurement	:10 mA
Accuracy	:0.5% from 1A to 6 A (secondary)
Burden	:< 0.03 VA at 5 A
Sustained overload	:6 A

VOLTAGE MEASUREMENT (TRMS)

Nominal phase voltage	:70 ~ 300 V AC
Minimum measurement	:10 V
Accuracy	:0.5% at full scale

POWER MEASUREMENT
Real power, apparent power, reactive power measurement

Measuring updating period	: 1 s
Accuracy	: 1.0%

POWER FACTOR MEASUREMENT
Total and displacement power factor

Accuracy	:1.0%

FREQUENCY MEASUREMENT

Measurement range	: 45 ~ 65 Hz
Measurement updating period	: 1s
Accuracy	: 0.5%

ENERGY ACCURACY

Active (according to IEC 62053-21)	: class 1
Reactive (according to IEC 62053-23)	: class 2

POWER SUPPLY

Self supplied	:100 ~ 240 V AC
Frequency	:50 / 60 Hz
Power consumption	:<3 VA

COMMUNICATION

Hardware interface	:Isolated RS485
Protocol	:Modbus-RTU
Baud rate	:2400, 4800, 9600, 19200, 38400

ENVIRONMENTAL CONDITIONS

Temperature	: -10°C to 55°C
Humidity	: 5% to 95%, non-condensing

MECHANICAL

Mounting	:DIN rail
Dimension (mm)	:65(w) x 85(h) x 50(d)
Approximate weight	:0.3 kg

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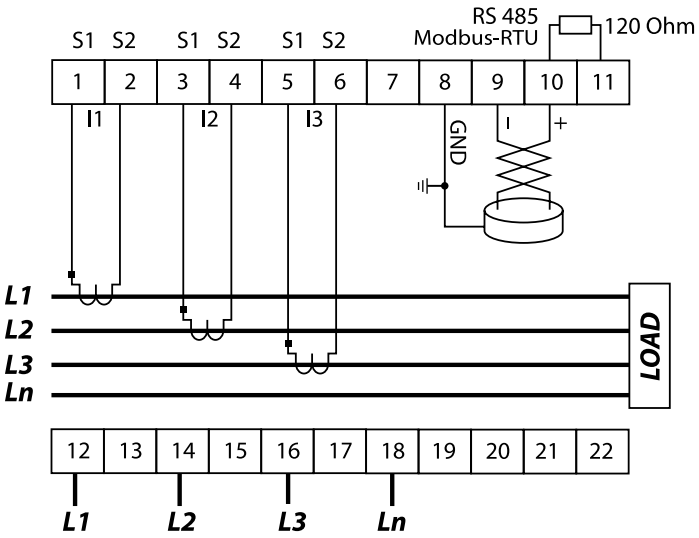
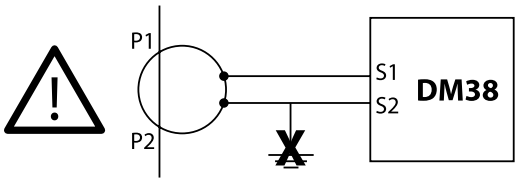
Typical Application Diagram

DM 38 CONNECTION DIAGRAM





NOTE: Current transformer secondary terminal **MUST NOT** be earthed.

Electromagnetic Compatibility (EMC)

Part 6-2: Generic Standards IEC61000-6-2
Immunity for industrial environments.

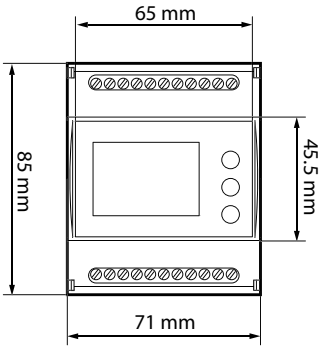
Part 6-4: Generic Standards IEC61000-6-4
Emission standard for industrial environments.

Ordering Information

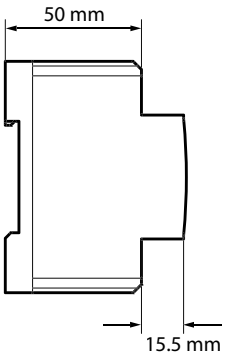
MODEL	DESCRIPTION
DM 38-240A	Self Powered 100~240 V AC

Case Dimensions

Front



Side



MU2300

Features

- Multifunction numerical voltage protection relay
- Low-set undervoltage stage (U<) with definite-time or inverse-time characteristic
- High-set undervoltage stage (U<<) with definite-time
- Low-set overvoltage stage (U>) with definite-time or inverse-time characteristic
- High-set overvoltage stage (U>>) with definite-time
- Negative sequence overvoltage protection (U_2>) with definite-time or inverse-time characteristic
- Neutral displacement / residual overvoltage protection (U_0>) with definite-time or inverse-time characteristic
- Can be used in single-phase or three-phase operation
- Multi-function isolated digital input with wide input voltage range
- Fault record and event code recording
- Five programmable voltage-free output contacts
- Isolated RS485 Modbus - RTU communication
- ANSI Code : 27, 47, 59, 60

Introduction

The MU2300 is a microprocessor based numerical relay for voltage protection functions in electrical distribution network.

Technical Data

INPUTS

Measuring input:

Rated voltage input : 57 ~ 130 V
Rated frequency : 50 / 60 Hz

Rated auxiliary voltage:

Model MU2300-150D : 24 ~ 150 V DC
Model MU2300-240AD : 85 ~ 265 V AC
110 ~ 340 V DC

Power consumption:

AC auxiliary voltage : 6 ~ 10 VA typical
DC auxiliary voltage : 5 ~ 9 W typical

Binary Input:

External binary input : 85 ~ 265 V AC/DC

COMMUNICATION

RS485 Modbus - RTU

OUTPUT CONTACTS

5 programmable contacts + 1 IRF contact:

Rated voltage : 250 V AC / DC
Continuous carry : 5 A
Make and carry for 0.2 s : 30 A
Expected electrical life : 100,000 operations at rated current
Expected mechanical life : 5 x 10^6 operations

UNDER-VOLTAGE ELEMENT

Low set setting U< : 5 - 130 V
High set setting U<< : 5 - 130 V
Time multiplier, TMS : 0.5 - 100
Low-set definite time tU< : 0 - 600 s
High-set definite time tU<< : 0 - 600 s

OVER-VOLTAGE ELEMENT

Low set setting U> : 5 - 200 V
High set setting U>> : 5 - 260 V
Time multiplier, TMS : 0.5 - 100
Low-set definite time tU> : 0 - 600 s
High-set definite time tU>> : 0 - 600 s

NEGATIVE SEQUENCE OVER-VOLTAGE ELEMENT

Negative sequence over-voltage setting, U_2> : 5 - 200 V
Time multiplier, TMS : 0.5 - 100
Negative sequence over-voltage definite time tU_2> : 0 - 600 s

RESIDUAL OVER-VOLTAGE ELEMENT

Residual over-voltage setting, U_0> : 0.5 - 130 V
Time multiplier, TMS : 0.5 - 100
Residual over-voltage definite time tU_0> : 0 - 600 s

ENVIRONMENTAL CONDITIONS

Temperature : -10°C to 55°C
Humidity : 5% to 95%, non-condensing

MECHANICAL

Mounting : Panel mounting
Dimension (mm) : 142(w) x 165(h) x 198(d)
Enclosure protection : IP54 at the panel
Approximate weight : 2.7 kg

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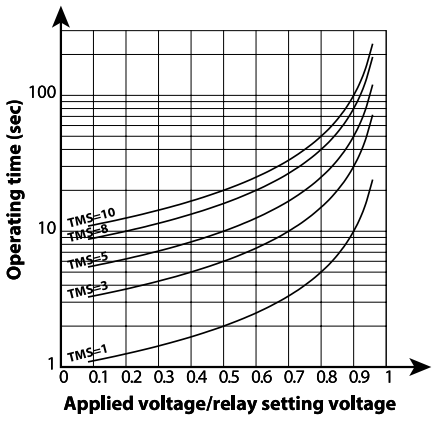
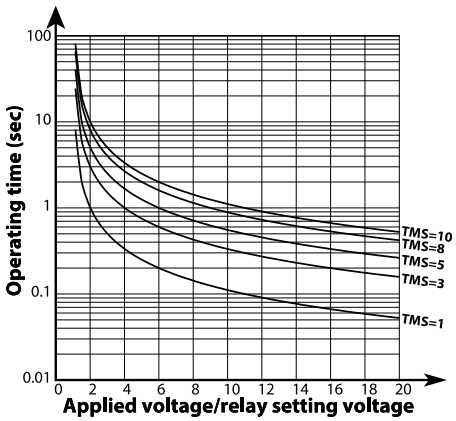
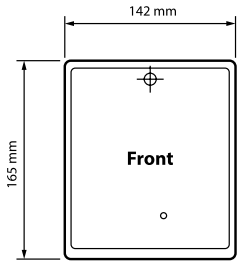
Undervoltage Characteristic

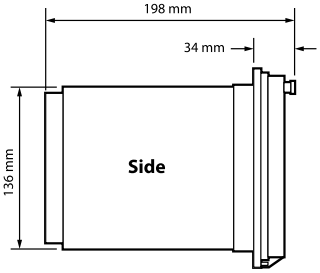


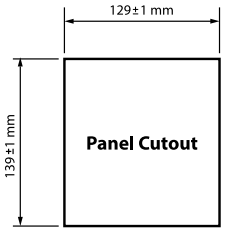
Overvoltage Characteristic



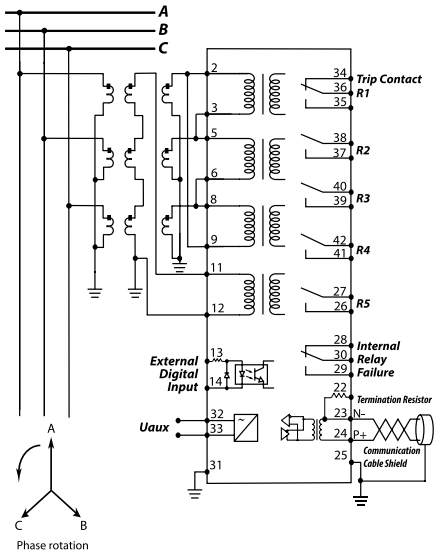
Case Dimensions



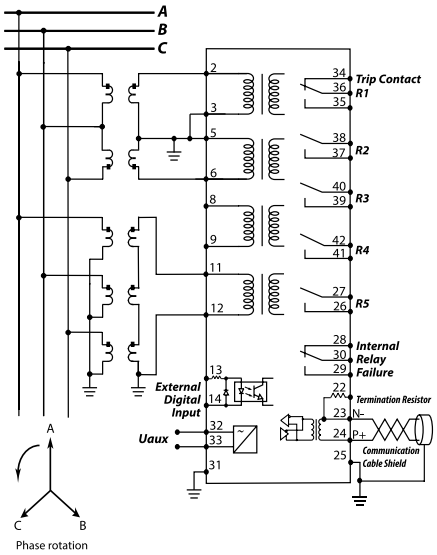




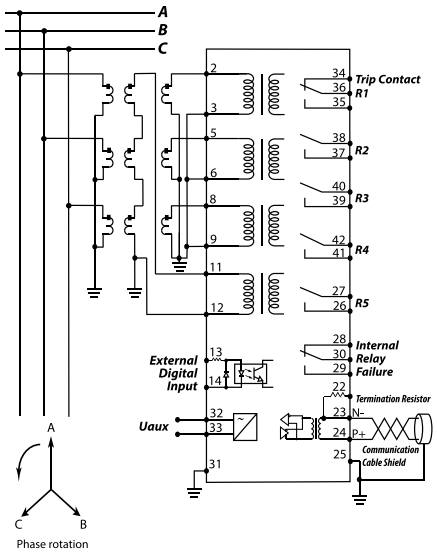
Typical Application Diagrams



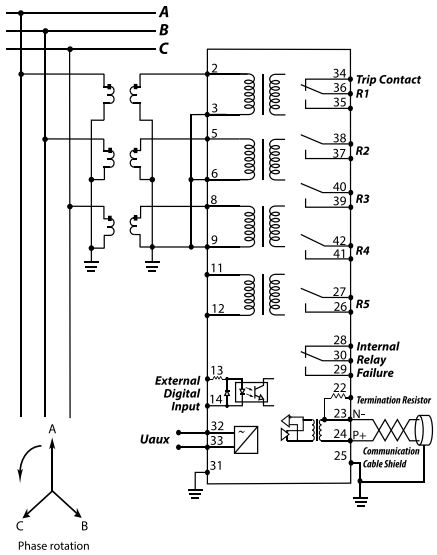
$3V_{p\text{-}p} + V_{residual}$ connection



$2V_{p\text{-}p} + V_{residual}$ connection



$3V_{p\text{-}n} + V_{residual}$ connection



$3V_{p\text{-}n}$ connection

Ordering Information

MODEL	DESCRIPTION
MU2300-150D	For 50 / 60 Hz system, auxiliary voltage 24 ~ 150 V DC
MU2300-240AD	For 50 / 60 Hz system, auxiliary voltage 85 ~ 265 V AC or 110~340 V DC

MU350

Product Description

MU350 is 3-phase voltage relay that combines various protections and starting delay.

Features

- Undervoltage
- Overvoltage
- Delay-on
- 2 voltage-free output contacts
- Voltage and frequency display
- 3-Phase
- Unbalance
- Phase loss
- Phase sequence
- With or without neutral connection
- Phase to phase or phase to neutral monitoring
- Programmable relay outputs
- ANSI Code : 27, 47, 59, 60

Technical Data

SETTING RANGES

Undervoltage	: Off, 1% to 25%
Time delay for undervoltage	: 0.1s to 30s
Overvoltage	: Off, 1% to 20%
Time delay for overvoltage	: 0.1s to 30s
Start time delay	: 0s to 999s
Unbalance	: Off, 3% to 20%
Time delay for unbalance	: 0.5s to 30s
Phase loss	: Fixed time <0.5s
Phase sequence	: Fixed time <0.5s

AUXILIARY SUPPLY

MU350-415V (+20%) AC	: 380 V (-25%) to 415 V
Supply frequency	: 45 Hz to 65 Hz
Maximum power consumption	: 3VA

MEASURING INPUT

Line to line	: 100 to 415 (+20%) VAC
Line to Neutral	: 58 to 240 (+20%) VAC

OUTPUT CONTACTS

Rated voltage	: 250 V AC
Contact rating	: 5 A
Expected electrical life	: 100,000 operations at rated current
Expected mechanical life	: 5 x 10^6 operations

INDICATORS

Auxiliary supply	: Green indicator
Pickup indicator	: Red indicator
Trip	: 7-segment display and red LED indicators

ACCURACY

Protection thresholds	: ± 3%
Time delay	: 0 to 0.5s, ± 15% with minimum 40ms
	: 0.6s and above, < ± 3%
Measurements	: ± 3%

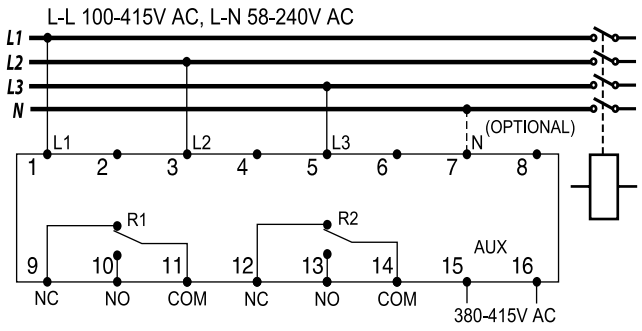
ENVIRONMENTAL CONDITIONS

Temperature	: -10°C to 55°C
Humidity	: 5% to 95%, non-condensing

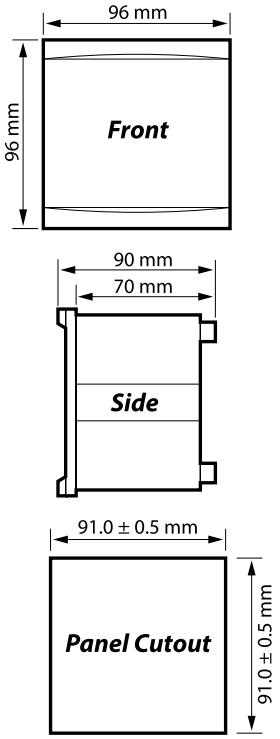
MECHANICAL

Mounting	: Panel mounting
Dimension (mm)	: 96(w) x 96(h) x 90(d)
Approximate weight	: 0.31 kg

Typical Application Diagrams



Case Dimensions



Ordering Information

MODEL	DESCRIPTION
MU350-415V	3-Phase, auxiliary voltage 380 ~ 415 V AC, 45-65 Hz
MU350-240V	3-Phase, auxiliary voltage 220 ~ 240 V AC, 45-65 Hz

MU 150

MU 250

MU250 150

Product Description

MU150 and MU250 are voltage relays that combine various protections and starting delay.

MU150 is used for single-phase monitoring while MU250 is used for 3-phase monitoring.

Features

- Microprocessor based numerical relay
- Undervoltage
- Overvoltage
- Delay-on
- 2 voltage-free output contacts
- Voltage and frequency display
- ANSI Code : 27, 47, 59, 60

Features For MU 250 only

- 3-Phase
- Unbalance
- Phase loss
- Phase sequence
- With or without neutral connection
- Phase to phase or phase to neutral monitoring

Technical Data

SETTING RANGES

Undervoltage	:1% to 25%
Time delay for undervoltage	:0.1s to 30s
Overvoltage	:1% to 20%
Time delay for overvoltage	:0.1s to 30s
Start time delay	:0s to 999s

For MU250 only:

Unbalance	:3% to 20%
Time delay for unbalance	:0.5s to 30s
Phase loss	:Fixed time <0.5s
Phase sequence	:Fixed time <0.5s

POWER SUPPLY INPUT

Input voltage:

MU150-110V & MU250-110V
:100 V (-25%) to 120 V (+20%) AC
MU150-240V & MU250-220V
:220 V (-25%) to 240 V (+20%) AC
MU250-415V
:380 V (-25%) to 415 V (+20%)
Supply frequency :45 Hz to 65 Hz

Maximum power consumption:

MU250 :3VA
MU150 :2.5VA

OUTPUT CONTACTS

Rated voltage	:250 V AC
Contact rating	:5 A
Expected electrical life	:100,000 operations at rated current
Expected mechanical life	:5 x 10^6 operations

INDICATORS

Auxiliary supply	: Green indicator
Pickup indicator	: Red indicator
Trip	: 7-segment display and red LED indicators

ACCURACY

Protection thresholds	: ± 3%
Time delay	: 0 to 0.5s, ± 15% with minimum 40ms
	: 0.6s and above, < ± 3%
Measurements	: ± 3%

ENVIRONMENTAL CONDITIONS

Temperature	: -10°C to 55°C
Humidity	: 5% to 95%, non-condensing

MECHANICAL

Mounting	: DIN rail
Dimension (mm)	: 71(w) x 85(h) x 70(d)
Approximate weight	: 0.4 kg

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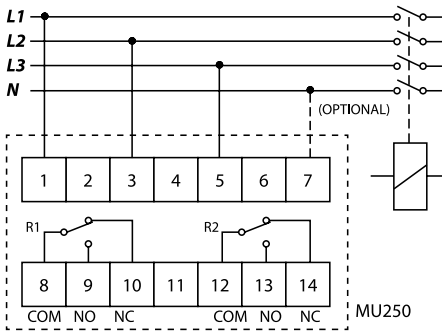
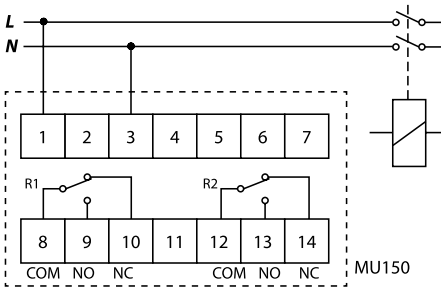
Typical Application Diagrams

MU250

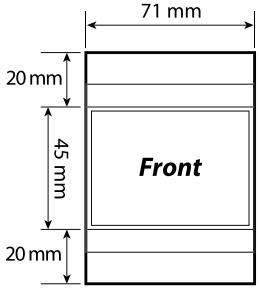


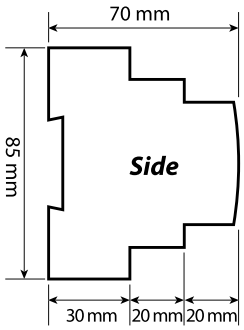
(Neutral connection is optional)

MU150



Case Dimensions





Ordering Information

MODEL	DESCRIPTION
MU150-110V	Single-Phase, 100/110/120 V AC, 45-65 Hz power supply
MU150-240V	Single-Phase, 220/230/240 V AC, 45-65 Hz power supply
MU250-110V	3-phase, 100/110/120 V AC 45-65 Hz power supply
MU250-220V	3-phase, 220/230/240 V AC 45-65 Hz power supply
MU250-415V	3-Phase, 380/400/415 V AC, 45-65 Hz power supply

MX210

Features

- Numerical voltage protection relay
- Undervoltage
- Overvoltage
- Phase loss
- Phase sequence
- 3-Phase/Single-phase
- ANSI Code: 27, 47, 59

Product Description

MX210 is voltage relay that combines overvoltage, undervoltage, phase loss, phase sequence and delay start functions.

MX210 can be programmed by user to set nominal voltage as well as set into 3-phase or Single-phase mode.

Technical Data

POWER SUPPLY INPUT

3-Phase System

Phase-to-phase voltage	: 380 V (-25%) to 415 V (+20%) AC

Single Phase

Phase-to-neutral voltage	: 220 V (-25%) to 240 V (+20%) AC
Frequency range	: 45 to 65 Hz
Max. power consumption	: 3 VA maximum

OUTPUT CONTACTS

Rated voltage	: 250 V AC
Contact rating	: 5 A
Expected electrical life	: 100,000 operations at rated current
Expected mechanical life	: 5 x 10^6 operations

SETTING RANGES

Undervoltage	:78% - 98%
Overvoltage	:102% - 122%
Delay time	:0.1 - 10s
Normal voltage	:380, 400, 415 Vp-p, 220, 230, 240, Vp-n
	3-phase / Single-phase

ACCURACY

Protection thresholds	:± 3%
Hysteresis	:1%
Delay time	:0-0.5s, ± 15%, 40ms minimum
	:0.5s and above, ± 3%
Measurements	:± 3%

INDICATORS

Power supply ON	: Green indicator
Output ON	: Green indicator
Undervoltage	: Red indicator
Overvoltage	: Red indicator
Phase error	: Red indicator

ENVIRONMENTAL CONDITIONS

Temperature	: -10°C to 55°C
Humidity	: 5% to 95%, non-condensing

MECHANICAL

Mounting	: DIN rail
Dimension (mm)	: 71(w) x 85(h) x 70(d)
Approximate weight	: 0.3 kg

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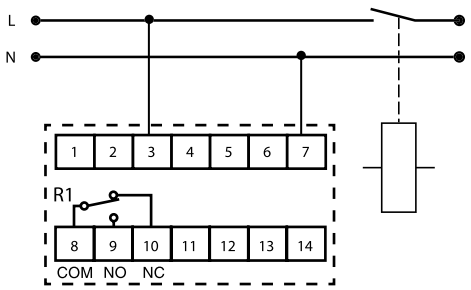
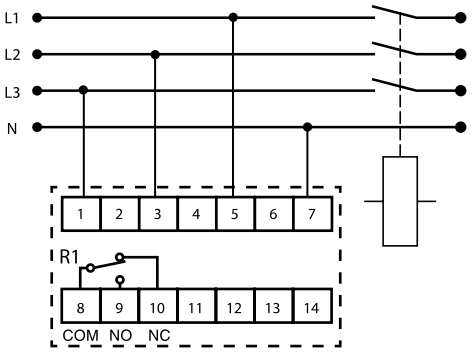
Wiring Diagram

Single-Phase System

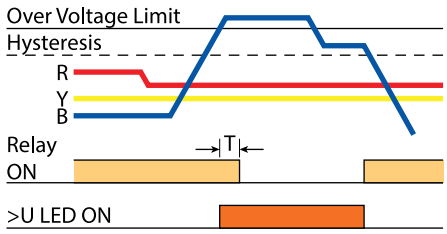


3-Phase System

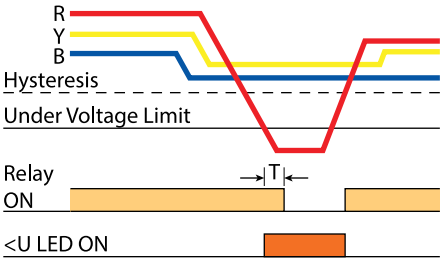


Operations Diagram

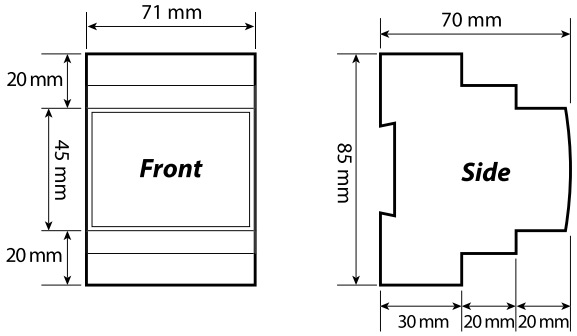
i) Over Voltage Function



ii) Under Voltage Function



Case Dimensions



Ordering Information

MODEL	DESCRIPTION
MX210 - 415V	3-Phase 380-415V AC Single-Phase 220-240V AC 45-65Hz

MX 100 / 50

Features

- Electronic monitoring relay
- Phase sequence monitoring*
- Phase failure monitoring
- Plug-in type module
- Indicators for power and alarm status
- ANSI Code : 47

Product Description

This phase sequence and phase failure relay is designed for application where the 3-phase supply needs to be continuously monitored for proper sequencing and phase loss. Commonly used to protect a 3-phase motor.

Technical Data

POWER SUPPLY INPUT

Phase-to-phase voltage	: 230 V AC ±20% : 400 V AC ±20%
Frequency range	: 45 to 65 Hz
Max power consumption	: 3 VA
Input connections	: Phase L1 to pin 5 Phase L2 to pin 6 Phase L3 to pin 7 Neutral (optional) to pin 11

OUTPUT CONTACTS

Rated voltage	: 250 V AC
Contact rating	: 5 A
Expected electrical life	: 100,000 operations at rated current
Expected mechanical life	: 5 x 10^6 operations

INDICATORS

Power supply ON	: Green indicator
Output ON	: Red indicator

ENVIRONMENTAL CONDITIONS

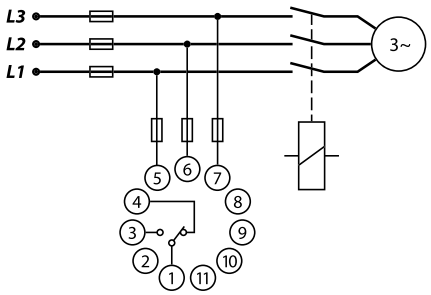
Temperature	: -5˚C to +55˚C
Humidity	: 56 days at 93% RH and 40˚C non-condensing

MECHANICAL

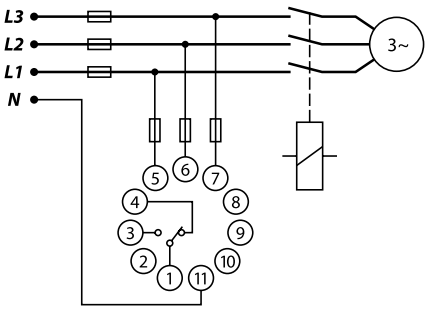
Mounting	: Circular 11-pin plug-in socket
Dimension (mm)	: 35(w) x 80(h) x 72.5(d)
Approximate weight	: 0.3 kg

Wiring Diagram

Example 1



Example 2

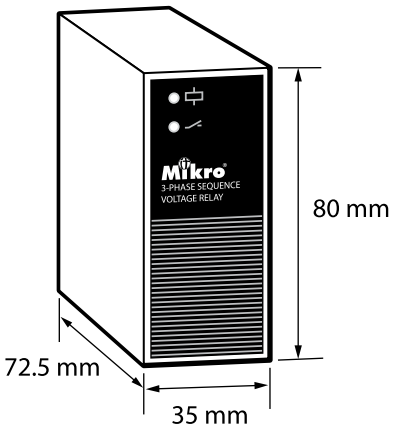


Function Table

Condition	Pin 5	Pin 6	Pin 7	Relay	Remark
1	L1	L2	L3	ON	System healthy
2	Loss	L2	L3	OFF	Phase failure
3	L1	Loss	L3	OFF	Phase failure
4	L1	L2	Loss	OFF	Phase failure
5	L2	L1	L3	OFF	Sequence fault*
6	L3	L2	L1	OFF	Sequence fault*

* Applicable to MX100 model only

Case Dimensions



Ordering Information

MODEL	DESCRIPTION
MX100 - 230	Auxiliary voltage 184~276 V AC
MX100 - 400	Auxiliary voltage 320~480 V AC
MX50 - 230	Auxiliary voltage 184~276 V AC
MX50 - 400	Auxiliary voltage 320~480 V AC

RPR415A

Features

- Reverse power monitoring
- 3-phase, 3 or 4-wire system
- Adjustable reverse power setting
- Adjustable tripping time delay
- Indicators for auxiliary power, trip delay and trip status
- Test button
- ANSI Code: 32

Product Description

RPR 415A relay is a directionally controlled timing relay used to protect AC generators from motoring. When such condition occurs and the reverse current exceeded the customer adjustable preset limit for a predetermined delay time, the trip relay operates to disconnect the circuit.

Technical Data

INPUT

Rated Phase-neutral voltage : 220V to 240V AC
Rated Phase-phase voltage : 380V to 415V AC
Rated frequency : 50 or 60 Hz
Rated current (In) : 5A
Burden : < 0.3 VA at In
Thermal withstand : 1.2 x Un , 2 x In continuous
: 1.2 x Un , 10 x In for 3 sec
Power consumption : 3 VA maximum

OUTPUT CONTACTS

Rated voltage : 250 V AC/DC
Contact rating : 5 A
Expected electrical life : 100,000 operations at rated current
Expected mechanical life : 5 x 10^6 operations

SETTING RANGES

Range : 2% to 20% reverse current with 1% Hysteresis
Time delay : 0 sec to 20 sec
3-Phase 4-wire (star) or 3-Phase 3-wire (delta)

ACCURACY

Protection thresholds Hysteresis : ± 3%
Delay time : 1%
: 0-0.5s, ± 15%, 40ms minimum.
Measurements : 0.5s and above, ± 3% : ± 3%

INDICATORS

Auxiliary supply : Green indicator
Delay : Red indicator
Trip : Red indicator

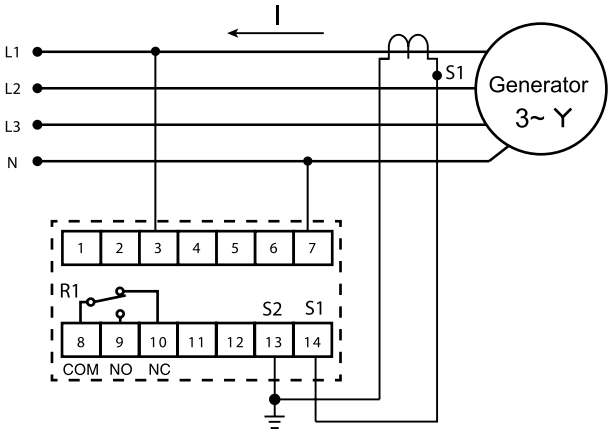
ENVIRONMENTAL CONDITIONS

Temperature : -10°C to 55°C
Humidity : 5% to 95%, non-condensing

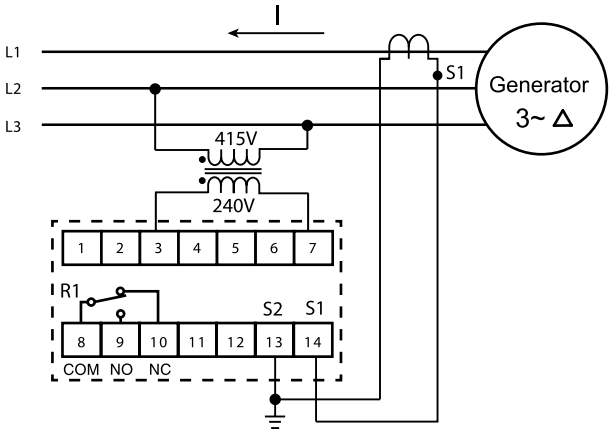
MECHANICAL

Mounting : DIN rail
Dimension (mm) : 71(w) x 85(h) x 70(d)
Approximate weight : 0.3 kg

Typical Application Diagram

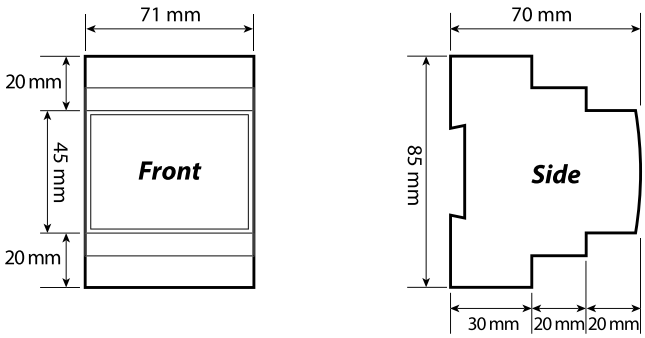


3-Phase 4-wire / single-phase system



3-Phase 3-wire system

Case Dimensions



Ordering Information

MODEL	DESCRIPTION
RPR415A	380-415Vpp AC / 220-240Vpn AC, 45-65Hz

RPR415B

Features

- Reverse power monitoring
- 3-phase-4-wire system
- Adjustable reverse power setting
- Adjustable tripping time delay
- Indicators for auxiliary power, trip delay and trip status
- Test button
- ANSI Code : 32

Product Description

The RPR 415B relay is a directionally controlled timing relay used to protect AC generators from motoring. When such a condition occurs and the reverse current exceeded the customer adjustable preset limit and the current persists for a predetermined delay time, the trip relay operates to diconnect the circuit.

Technical Data

INPUT

Rated Phase-neutral voltage : 220V to 240V AC
Rated Phase-phase voltage : 380V to 415V AC
Rated frequency : 50 or 60 Hz
Rated current (In) : 5A
Burden : < 0.3 VA at In
Thermal withstand : 1.2 x Un , 2 x In continuous
: 1.2 x Un , 10 x In for 3 sec
Power consumption : 3 VA maximum

OUTPUT CONTACTS

Rated voltage : 250 V AC/DC
Contact rating : 5 A
Expected electrical life : 100,000 operations at rated current
Expected mechanical life : 5 x 10^6 operations

SETTING RANGES

Range : 2% to 20% reverse current with 1% Hysteresis
Time delay : 0 sec to 20 sec
3-Phase 4-wire (star) or 3-Phase 3-wire (delta)

ACCURACY

Protection thresholds Hysteresis : ± 3%
Delay time : 1%
: 0-0.5s, ± 15%, 40ms minimum.
Measurements : 0.5s and above, ± 3% : ± 3%

INDICATORS

Auxiliary supply : Green indicator
Delay : Red indicator
Trip : Red indicator

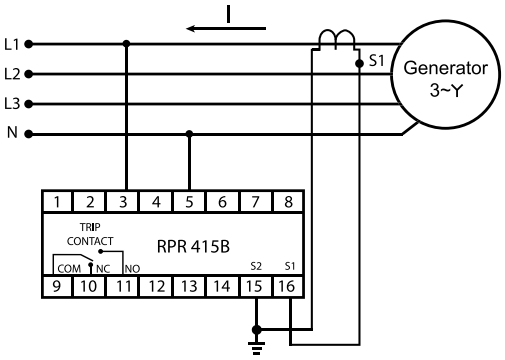
ENVIRONMENTAL CONDITIONS

Temperature : -10°C to 55°C
Humidity : 5% to 95%, non-condensing

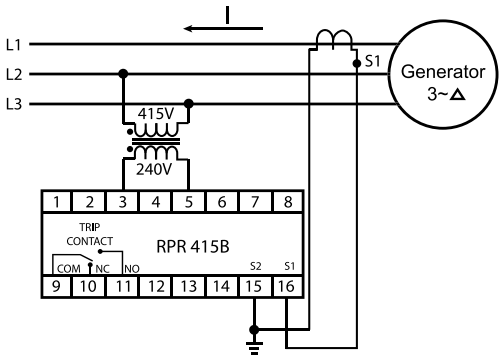
MECHANICAL

Mounting : Panel mounting
Dimension (mm) : 71(w) x 85(h) x 70(d)
Approximate weight : 0.6 kg

Typical Application Diagram

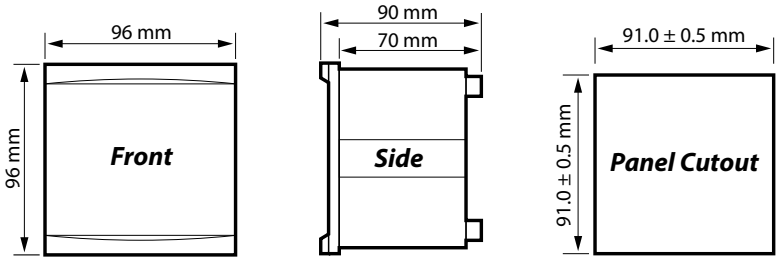


3-Phase 4-wire / single-phase system



3-Phase 3 wire system

Case Dimensions



Ordering Information

MODEL	DESCRIPTION
RPR415B	Auxiliary voltage 380 ~ 440 V AC

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Power Factor Regulator

PFR140
120
80
60

Features

- Microprocessor based intelligent auto switching control
- Automatic C/K and rated step adjustment
- Automatic CT polarity correction
- Display of power factor, current & total harmonic distortion of current
- Programmable sensitivity
- Last step can be used as alarm/fan output
- Under/over voltage alarm, under/over compensate alarm & high harmonic distortion alarm
- User-friendly setting
- Complies with IEC 61000-6-2 standard

Technical Data

RATINGS AUXILIARY POWER SUPPLY

Current Supply voltage	:220~240 V AC / 380~415 V AC
Operating Limits	:-15% + 10%
Consumption	:10 VA max
Rated frequency	:50 Hz or 60 Hz

OUTPUT CONTACTS

Numbers of outputs	:6 / 8 / 12 / 14 (PFR60/PFR80 /PFR120/PFR140)
Rated voltage	: 250 V AC
Contact rating	:5 A
Expected electrical life	:100,000 operations at rated current
Expected mechanical life	:5 x 10^6 operations
Max current for the common terminals	:12 A continuous

CURRENT INPUT

Rated current (In)	: 5 A
Operating Limits	: 0.05 A to 6.5 A
Rated Frequency	: 50 Hz or 60 Hz

CONTROL RANGE

Power factor setting	: 0.8 Ind - 0.8 Cap
C/K setting	: 0.03 - 1.20 / Automatic
Switching sensitivity	: 5 - 600 s/step
Reconnection time for same step	: 5 - 240 s
THD threshold	: 0.20 - 3.00 (20% - 300%) / OFF
Switching Program	: Automatic / Automatic Rotate / 4-quadrant / Manual
Rated step coefficient	: 0 / 1 / 2 / 3 / 4 / 5 / 6 / 8 / 12 / 16 (Automatic if C/K set to Auto)

ENVIRONMENTAL CONDITIONS

Temperature	: -10°C to 55°C
Humidity	: 5% to 95%, non-condensing

MECHANICAL

Mounting	: Panel mounting
Dimension (mm)	: 144(w) x 144(h) x 90(d)
Enclosure protection	: IP54 at the panel
Approximate weight	: 1.2 kg

PFR 140 / 120 / 80 / 60

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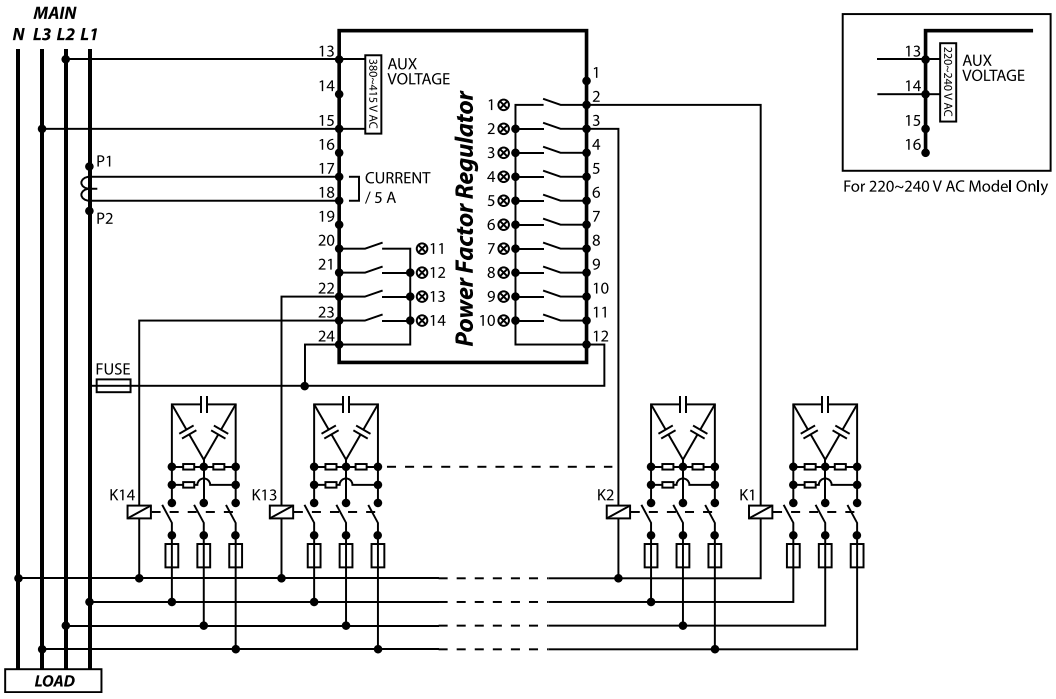
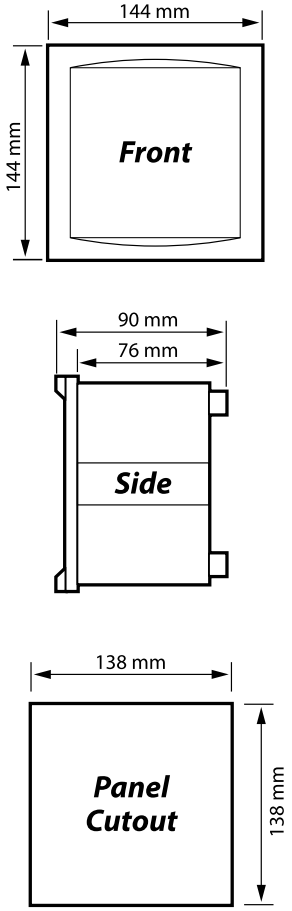
Typical Application Diagram



Case Dimensions



Ordering Information

MODEL	DESCRIPTION
PFR60 - 415 - 50	6 Steps, 50 Hz system, auxiliary voltage 380~415 V AC
PFR80 - 415 - 50	8 Steps, 50 Hz system, auxiliary voltage 380~415 V AC
PFR120 - 415 - 50	12 Steps, 50 Hz system, auxiliary voltage 380~415 V AC
PFR140 - 415 - 50	14 Steps, 50 Hz system, auxiliary voltage 380~415 V AC
PFR60 - 220 - 50	6 Steps, 50 Hz system, auxiliary voltage 220~240 V AC
PFR80 - 220 - 50	8 Steps, 50 Hz system, auxiliary voltage 220~240 V AC
PFR120 - 220 - 50	12 Steps, 50 Hz system, auxiliary voltage 220~240 V AC
PFR140 - 220 - 50	14 Steps, 50 Hz system, auxiliary voltage 220~240 V AC
PFR60 - 415 - 60	6 Steps, 60 Hz system, auxiliary voltage 380~415 V AC
PFR80 - 415 - 60	8 Steps, 60 Hz system, auxiliary voltage 380~415 V AC
PFR120 - 415 - 60	12 Steps, 60 Hz system, auxiliary voltage 380~415 V AC
PFR140 - 415 - 60	14 Steps, 60 Hz system, auxiliary voltage 380~415 V AC
PFR60 - 220 - 60	6 Steps, 60 Hz system, auxiliary voltage 220~240 V AC
PFR80 - 220 - 60	8 Steps, 60 Hz system, auxiliary voltage 220~240 V AC
PFR120 - 220 - 60	12 Steps, 60 Hz system, auxiliary voltage 220~240 V AC
PFR140 - 220 - 60	14 Steps, 60 Hz system, auxiliary voltage 220~240 V AC

PFR96
96P

Features

- Microprocessor based intelligent auto switching control
- Automatic C/K and rated step adjustment
- Automatic CT polarity correction
- Display of power factor & current
- Programmable sensitivity
- Last step can be used as alarm/fan output
- Under/over voltage alarm, under/over compensate alarm
- User-friendly setting
- Complies with IEC 61000-6-2 standard

For PFR 96

- For single-phase system

For PFR 96P

- For 3-phase system

Technical Data

RATINGS AUXILIARY POWER SUPPLY

Model PFR96	: 110 ~ 120 V AC / 220 ~ 240 V AC
Model PFR96P	: 380 ~ 415 V AC
Operating Limits	: -15% + 10%
Consumption	: 10 VA max
Rated frequency	: 50 Hz or 60 Hz

OUTPUT CONTACTS

Numbers of outputs	: 6
Rated voltage	: 250 V AC
Contact rating	: 5 A
Expected electrical life	: 100,000 operations at rated current
Expected mechanical life	: 5 x 10^6 operations
Max current for the common terminals	: 12 A continuous

CURRENT INPUT

Rated current (In)	: 5 A
Operating Limits	: 0.15 A to 6.5 A
Rated frequency	: 50 Hz or 60 Hz

CONTROL RANGE

Power factor setting	: 0.8 Ind - 0.8 Cap
C/K setting	: 0.03 - 1.20 / Automatic
Switching sensitivity	: 5 - 600 s/step
Reconnection time for same step	: 5 - 240 s
Switching Program	: Automatic / Automatic Rotate / 4-quadrant / Manual
Rated step coefficient	: 0 / 1 / 2 / 3 / 4 / 5 / 6 / 8 / 12 / 16 (Automatic if C/K set to Auto)

ENVIRONMENTAL CONDITIONS

Temperature	: -10°C to 55°C
Humidity	: 5% to 95%, non-condensing

MECHANICAL

Mounting	: Panel mounting
Dimension (mm)	: 96(w) x 96(h) x 90(d)
Approximate weight	: 0.6 kg

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Typical Application Diagram

Diagram 1 - For model PFR96

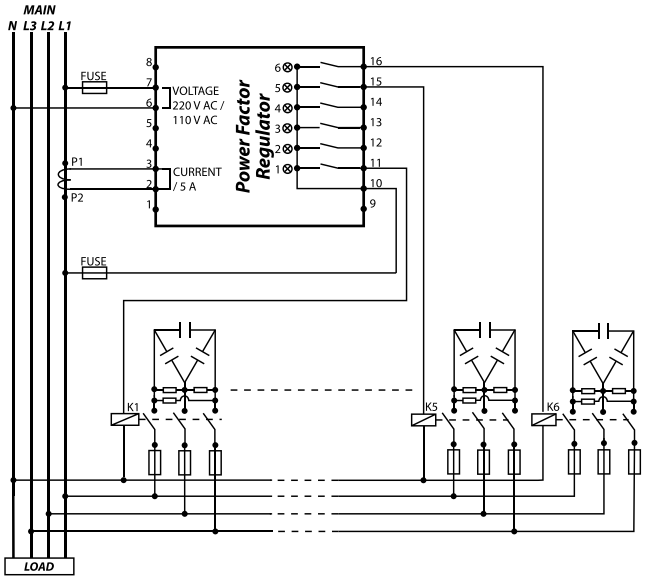
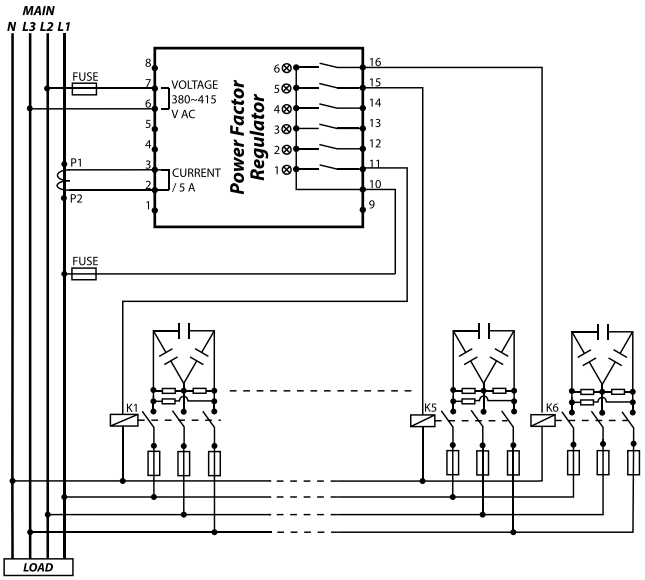
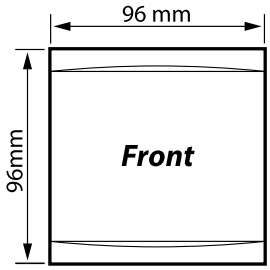
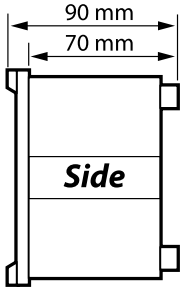


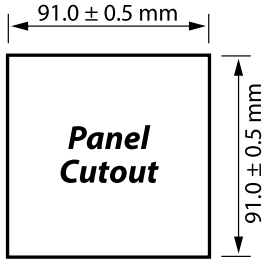
Diagram 2 - For model PFR96P



Case Dimensions







Ordering Information

MODEL	DESCRIPTION
PFR96 - 220 - 50	6 Steps, for 50 Hz system, auxiliary voltage 220~240 V AC
PFR96 - 220 - 60	6 Steps, for 60 Hz system, auxiliary voltage 220~240 V AC
PFR96 - 110 - 50	6 Steps, for 50 Hz system, auxiliary voltage 110~120 V AC
PFR96 - 110 - 60	6 Steps, for 60 Hz system, auxiliary voltage 110~120 V AC
PFR96P - 415 - 50	6 Steps, for 50 Hz system, auxiliary voltage 380~415 V AC
PFR96P - 415 - 60	6 Steps, for 60 Hz system, auxiliary voltage 380~415 V AC

AN112
120
128
136

Programmable Alarm Annunciator

The AN1xx series Alarm Annunciator provides ideal solution for all your alarm system management and requirement. It comes with either 12, 20, 28 or 36 windows, and due to the use of microprocessor-based design, the alarm annunciator is highly flexible in terms of functionality and programmability, suitable for all application and industries.

Features

- 12, 20, 28 or 36 windows. Replaceable superbright LED modules, with choice of amber or red illumination
- 11 Alarm Sequences as per ISA-18.1 standard
- Each channel/window fully field programmable, either from front panel built-in pushbutton or using PC
- Option of either RS232 or RS485 MODBUS-RTU communication. Comes with user-friendly configuration software.
- Repeat relay for each window as well as numerous configurable multifunction output relays for connection to external equipment to form alarm management system
- Sleep or unattended mode feature is available, for stations not permanently manned
- Auto-silence and auto-acknowledge features, with delay settable from 1 – 255 s
- Other amount of windows available upon request.

Tests And Standards

Electrostatic discharge IEC61000-4-2, Class III, air discharge..... 8 KV
Electrostatic discharge IEC61000-4-2, Class III, contact discharge..... 6 KV
Electrical fast transient IEC61000-4-4..... 4 KV, 5/50ns
Surge immunity IEC61000-4-5..... 4 KV, L to E
Enclosure protection when panel mounted..... Front: IP41
..... Enclosure: IP30

Technical Data

WINDOW

Window Dimension : 50 x 30 mm.
Type : White translucent lens.
Colours : Red, Amber. Coloured by field replaceable LED module.
Windows Flash Fast : 1.4 Hz (0.4s on, 0.4s off),
Slow : 0.45 Hz (1.1s on, 1.1s off),
Intermittent: (0.4s on, 1.8s off),

ALARM SEQUENCES

M, A, R, R-12, F1A, F1M, F2A, F2M, F3A, F3M, Follower

AUXILIARY POWER INPUT

Fuse protected.
AN1xx-30 : 24-36 V DC or 18-27 V AC.
AN1xx-110 : 88-132 V DC or 64-95 V AC.
Power consumption : AN112: 6 W, AN120: 8 W, AN128: 10W, AN136: 12W

ALARM CONTACT INPUTS

Opto-isolated inputs

AN1xx-30 : 24-36 V DC
AN1xx-110 : 88-132 V DC
Input current : 3 mA typical

OUTPUT CONTACTS

Repeat relays : Potential free for each alarm point. 5 A at 250 V AC, 3 A at 30 V DC. Resistive load.
AUX1-AUX3, RBACK, SSP : 5 A at 250 V AC, 5 A at 30 V DC. Resistive load.

TERMINALS

Wire size : 28-14 AWG. (0.08mm2 to 2.5mm2)
Removable screw type terminal block

COMMUNICATION

Hardware interface : AN1xx - xx - x - A: RS232
AN1xx - xx - x - B : Isolated RS485
Protocol : Modbus - RTU
Baud rate : 300 to 57600

ENVIRONMENT CONDITIONS

Operation temperature : -20 to 60˚C
Storage temperature : -20 to 80˚C
Humidity : 0 - 95% RH, non condensing

MECHANICAL

Mounting : Panel Mounting
Approximate weight : AN 112 : 2.4 kg
AN 120 : 3.1 kg
AN 128 : 3.5 kg
AN 136 : 3.9 kg

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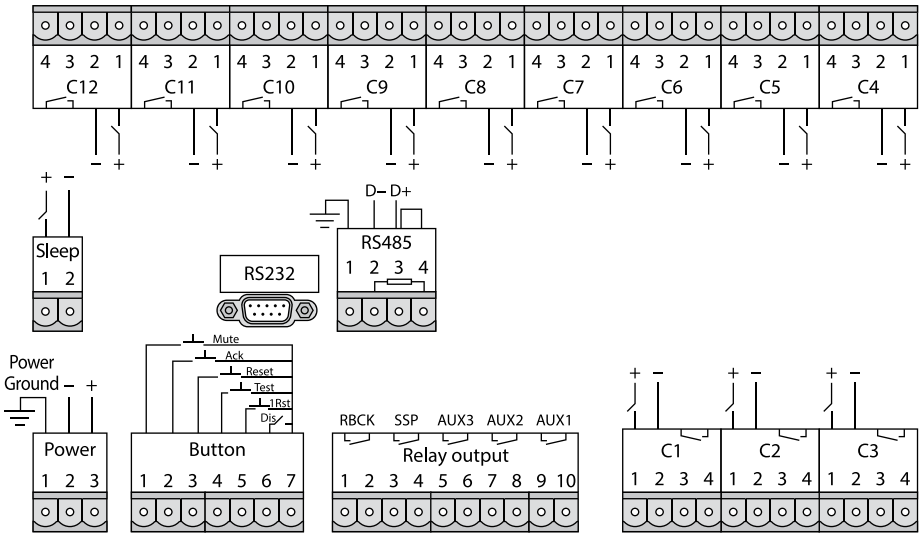
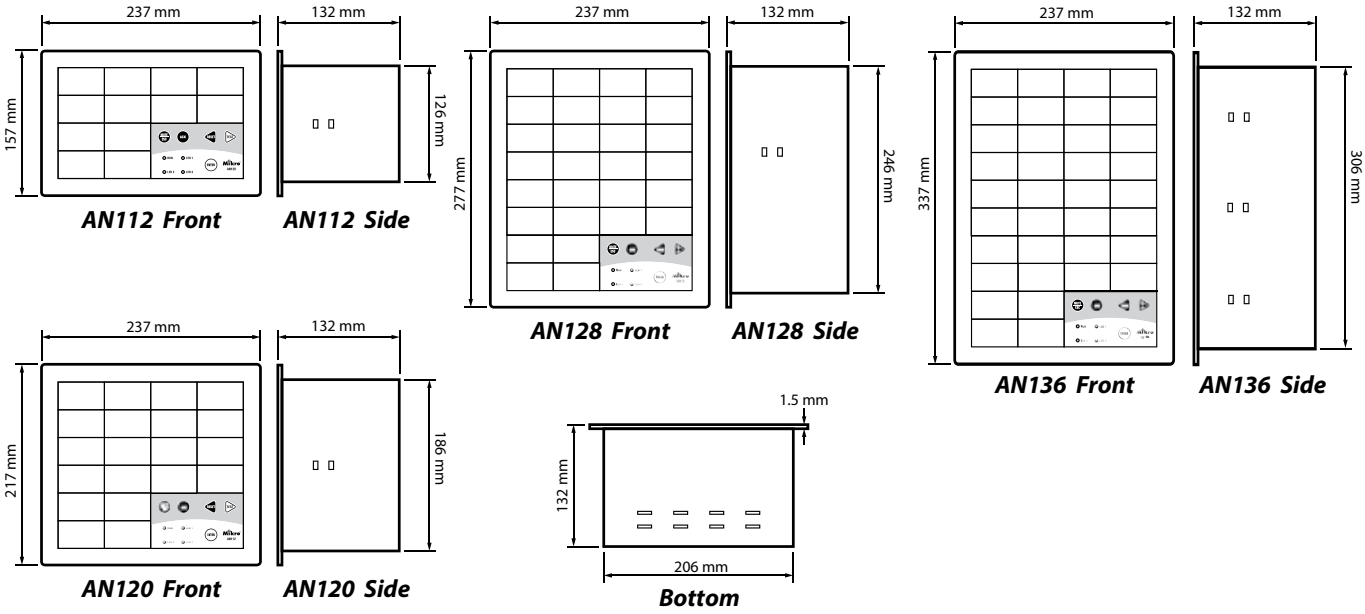
Typical Connection Diagram



Case Dimensions



Ordering Information

Order code:

AN1 □ - □ - □ - □

- □ ..... **A:** RS 232 communication / **B:** RS 485 communication
- □ ..... **0:** without repeat relays / **1:** with repeat relays
- □ ..... Power Supply: **30, 110** V DC
- □ ..... Number of Windows: **12, 20, 28, 36**

For example: 12 windows, 30 V DC, with repeat relays, RS232 communication: **AN112-30-1-A**

MPR500

Features

- Microprocessor based numerical relay
- Thermal overload
- Overcurrent
- Undercurrent
- Unbalance
- Phase loss
- Phase sequence
- Earth fault
- Prolonged starting/stall rotor
- 2 voltage-free output contacts
- ANSI Code : 37, 46, 47, 49, 50P, 50G

Technical Data

CT RATINGS

Rated current, IB : 2-10A
Rated frequency : 50 Hz or 60 Hz
Burden : <0.3 VA at rated current
Thermal withstand : Continuous : 2x max rated
45s : 6x max rated
1s : 10x max rated

BINARY INPUT

Rated input voltage : 12V (Supplied internally)

AUXILIARY SUPPLY

Model MPR 500-240AD : 85 ~ 265 V AC
110 ~ 370 V DC
Supply frequency : 50 or 60 Hz
Maximum power consumption : 3 VA typical

OUTPUT CONTACTS

Rated voltage : 250V AC
Contact rating : 5 A
Expected electrical life : 100,000 operations at rated current
Expected mechanical life : 5 x 10^6 operations

SETTING RANGES

Thermal Overload time constant, t_{6X} : 1 – 40s. Step 0.1s for 1-10s, step 1s for 10-40s.
Short circuit, I>> : off, 2-12 x I_B. Step 1 x I_B
Short circuit delay time, t>> : 0 – 25s. Step 0.1s for 1-10s, step 1s for 10-25s.
Undercurrent, I<< : off, 20-90% I_B. Step 1%
Undercurrent delay time, t<< : 0 – 60s. Step 0.1s for 1-10s, step 1s for 10-60s.
Unbalance, : off, 10-50%. Step 1%
Unbalance delay time, t : 0 – 25s. Step 0.1s for 1-10s, Step 1s for 10-25s.
Earth fault, I_θ : off, 10-60% I_B. Step 1%
Earth fault delay time, t_θ : 0 – 25s. Step 0.1s for 1-10s, step 1s for 10-25s.
Phass loss : < 500ms
Phase sequence : < 200ms
Prolonged starting/ stalled rotor, I_S : off, 2-12 x I_B. Step 0.1 x I_B
Prolonged starting time delay, t_{Start} : 0 – 60s. Step 0.1s for 1-10s, step 1s for 10-60s.
Stalled rotor delay time, t_{Stall} : 0 – 60s. Step 0.1s for 1-10s, step 1s for 10-60s.

INDICATORS

Run : Green indicator
Trip/Pickup : 7-segment display and red indicator
Thermal : Yellow indicator

ENVIRONMENTAL CONDITIONS

Temperature : -10°C to 55°C
Humidity : 5% to 95%, non-condensing

ACCURACY

Current accuracy : ± 5% (When I_L = 2A, I_o > 0.2A)
Timing accuracy : ± 5% or ± 50 ms

MECHANICAL

Mounting : Panel mounting
Dimension (mm) : 96(w) x 96(h) x 110(d)
Approximate weight : 0.8 kg

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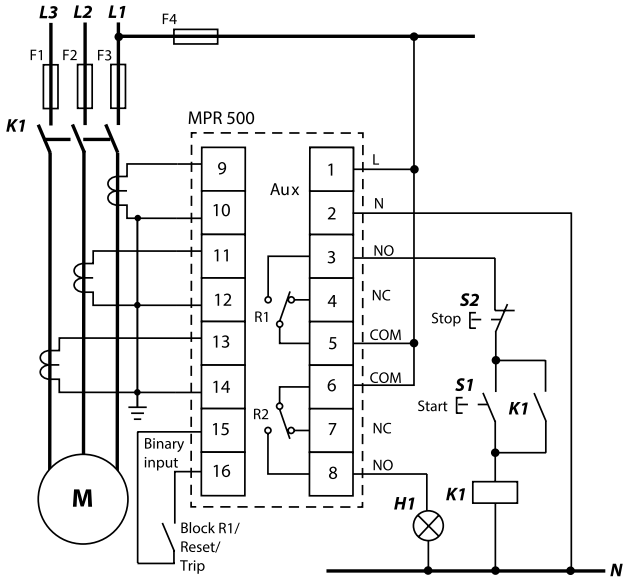
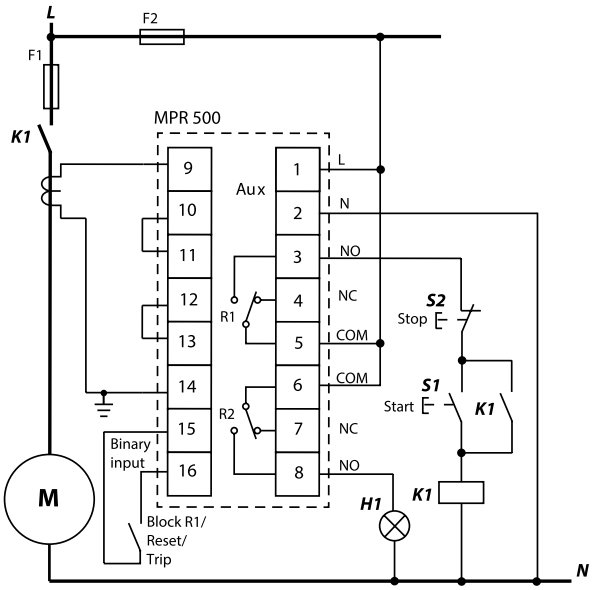
Typical Application Diagrams

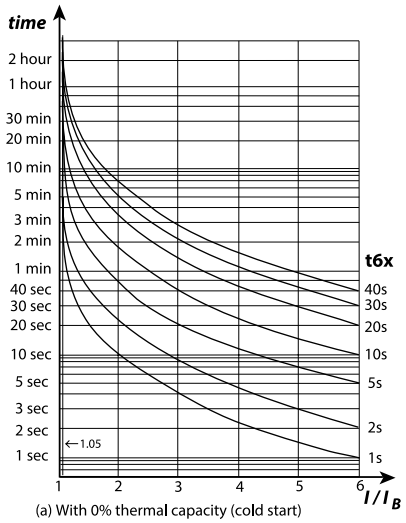


Motor with higher full load current using external CT

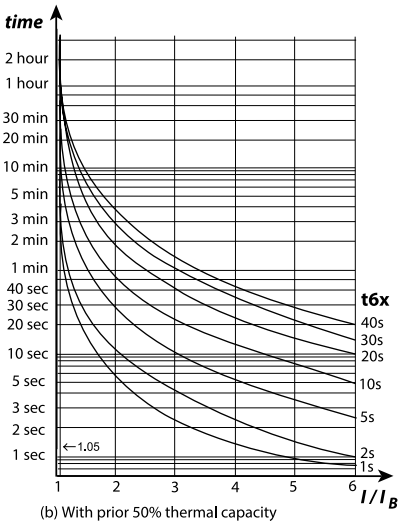


Single-Phase Motor
(Earth fault, phase sequence and phase loss detection off)

Thermal Tripping Curve

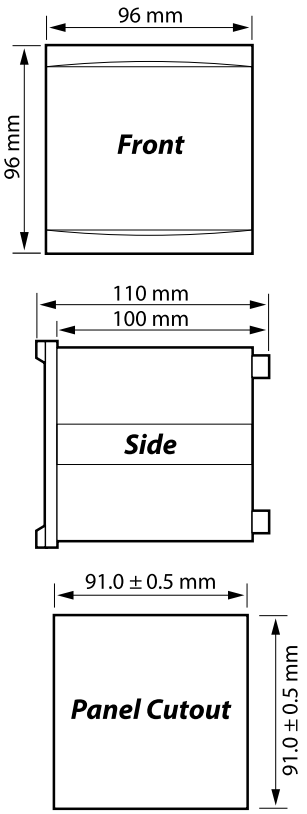


(a) With 0% thermal capacity (cold start)



(b) With prior 50% thermal capacity

Case Dimensions



Ordering Information

MODEL	DESCRIPTION
MPR500-240AD	For 50 / 60 Hz system, auxiliary voltage 85 ~ 265 V AC or 110 ~ 370 V DC

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40400 Shah Alam, Selangor, Malaysia.

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