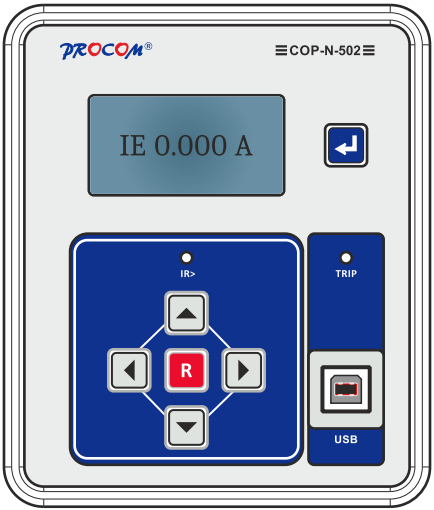
PROCOM®

Operating Instructions
COP-N-502



Installation Guide

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1.0 Introduction :

• The COP is Designed Using Numerical Technology (Discrete Fast Fourier Transformation.) Reliable & Accurate Tripping is Ensured by Deploying Digital Technique Using DSP. High Sampling Rate of 2000 Sample/Sec Ensures Actual Reproduction of Waveform.

- User Friendly HMI Eases Configuration & Operating procedure of Relay
- User Programmable Digital Output provides flexibility in Selecting Alarm Contact.
- In Addition to Default USB Part one
- Wide Auxiliary Supply(60-300 VDC/50-300VAC)
- All Protections can be programmed to be individually or collectively blocked by external input

2.0 Protection, Supervision Salient Features :

- 128x64 Pixel Graphical /display
- Event Recording
- Fault Data Recording
- RTC Stamp on Fault & Event
- Display in Primary/Secondary Values
- Wide Setting range with fine setting steps
- Front USB Port
- Self Supervision
- Remote Reset input

3.0 Digital Output :

COP-N had upto 4 NO Contact. one is reserved for tripping function. 3 are programmable for alarm function.

- Alarm 1 (NO Contact)
- Alarm 2 (NO Contact)
- Alarm 3 (NO Contact)
- Trip 1 (NO/NC Contact)

4.0 Display Parameter :

- Earth Current
- Date
- Time

5.0 Digital Input :
COP-N had up to 6 digital input.

- **Blocking Input :** Protection function can be blocked either by programming or using external blocking input. There are 4 blocking input and each protection function **IE>**, **IE>>,** can be assigned to set of the input.

- **Trip:** The external trip input can be used to trip the unit.

- **Reset:** The trip indication can be reset either Auto or Manually.
  If the **Trip Reset** function are programmed as **Auto** in system parameter then the trip contact & trip indication will reset automatically after clearance of fault.
  If the **Trip Reset** function are programmed as **Manual** in system parameter then the trip contact will reset automatically after clearance of fault but trip indication will reset either pressing the reset key on the front or external reset input shorted to the common.

6.0 Protection :
- Earth Fault Protection
- High set Earth Fault Protection

7.0 Switches Description :

The function of relay is controlled by the following switches. Back Switch, Next Switch, Up Switch, Down Switch, Enter key, Reset Key and Test Key which are provided on the front plate.

COP-N has a very sophisticated HMI build into it. These keys play different role under different function of HMI

Switch Symbol	Switch Function	Description
	Back Switch and Next Switch	To enter Edit/View Mode the Back Switch and Next Switch are pressed together.
	Back Switch	This key has dual function. **Programming Main Menu :** Back key is used to exit programming main menu & go to the display default mode. **Programming Sub Menu :** Back key is used to select the previous parameter to be programmed.
	Next Switch	This key has dual function. **Normal operation mode :** In this mode, it is used to change the parameters being displayed on LCD. **Programming Sub Menu :** Next key is used to select next parameter in programming sub menu.
	UP Switch	This key has dual function. **Programming Main Menu :** Up key is used to scroll the programming modes in programming main menu. **Programming Sub Menu :** Up key is used to increment the value of parameters in programming sub menu.
	Down switch	This key has dual function. **Programming Main Menu :** Down key is used to scroll the programming modes in programming main menu. **Programming Sub Menu :** Down key is used to decrement the value of parameter in programming sub menu.

	Enter Switch	This key has dual function. **Programming Main Menu:** Enter key is used to select the programming modes in programming main menu. **Programming Sub Menu :** Enter key is used to save the parameter in programming sub menu.
	Reset Switch	Reset key is used to reset the fault/ annunciations. & also used to discard the saving parameter while doing the settings and abort to main menu.

Note: At the time of setting if changes are not carried within 20s then the display will reset itself and return to the main menu.

8.0 LED Annunciations :

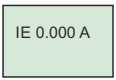
S.No	LED's	Description
1	IR>	Indicates low set earth fault

Indicates both low set and high set restricted earth fault.

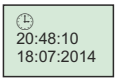
9.0 Display Measurement :
Graphical back-lit LCD Display is provided for parameter setting and for easy viewing of measurement, fault, event records, date and time, error message. Back-lit is automatically turned ON when any tripping occurs on particular equipment.

After Power ON , it will show the following display :

This window will flash momentarily showing the following display. Then the control will go automatically to next window which is shown below :



It will display the earth current. After 10 sec the display will automatically scroll to next display window or press **Next** key can be used to manually switch to next window.



This will display the time and date.

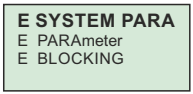
10.0 Setting Procedure :

COP-N has provision to program the operating parameters. It is user / site configurable. User can view all parameters, fault history, events, adjust clock, reset password and also edit the parameter.

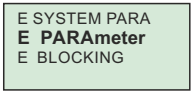
Press “Back Switch & Next Switch” simultaneously.
The LCD shall display, **“Programming Main Menu”**
This menu has a various programming modes which is scroll by **Up** and **Down** key.
Edit programming mode is password protected.
To select the programming mode in programming main menu, press **Enter** key.
The LCD display, **“Enter Password”**. The default password is 123 which is set by **UP & Down** key. Once the 123 is set, press **Enter** key.

e.g user wants to change the over current characteristics as IEC EINV in PARA SET 1

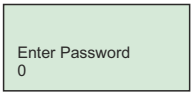
Press “Back Switch & Next Switch” simultaneously to enter the programming main menu



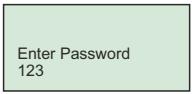
Press down key to select the **“E PARAMETER** programming mode



Press enter key to enter the programming sub menu

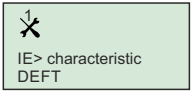


Press Up key to set the password which is default 123

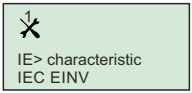


Press enter key

Press next key for next parameter



Press up key to change the characteristics
Press enter key to save the characteristics



Programming Main Menu

E SYSTEM PARA
E PARAMETER
E BLOCKING
E ANNUNCIATION
SET CLOCK
RESET PASS

V SYSTEM PARA
V PARAMETER
V BLOCKING
V ANNUNCIATION
V HISTORY
V EVENT

E SYSTEM PARA :

For any change in value, press Up switch and Down switch. For next parameter, press Next Switch. We can also view the previous parameter by pressing Back Switch. To save the parameter, press Enter key.

Display	Explanation of Parameter	Factory Setting	Setting Range	Setting Step
Earth CT Ratio	Ratio of current transformer, (Rated earth CT Primary current / Rated earth CT Secondary current)	1	1-9999	1

Test Function	For testing the unit, press the test key if this function is enabled.	Disabled	Enabled disabled	
Disp Auto Scroll	Measurement display auto scroll or manual scroll selection	Auto Scroll OFF	Auto Scroll On Auto Scroll off	
Dis I in Pri/Sec	Selection of Current display in primary values or secondary values	Primary	Primary Secondary	
Flag Reset	Reset for flag indication.	Auto	Auto Manual	
Trip Reset	Reset for tripped LED indication	Auto	Auto Manual	

E PARAMETER:

For any change in value of parameter, press Up switch and Down switch. For next parameter, press Next Switch. We can also view the previous parameter by pressing Back Switch. To save the parameter press, Enter key.

I e > in I/In	Desired Earth fault value in % of the rated current	0.10	0.10-10.0 I/In Disabled	0.01 I/In
I e> Characteristic	Time delay characteristic for Earth fault current	DEFT	DEFT Normal Inverse 0.6 Normal inverse 1.3 I4T ,I2T ,IT THERM FLAT ANSI EINV ANSI VINV ANSI MINV IEC EINV IEC LINV IEC VINV IEC NINV	
I e > Def Time	Definite time delay in seconds, will be valid only when definite time characteristic is selected	0.500 Sec	0.020-15.000 Sec	0.005 Sec
I e > Time Multiplier	Inverse time multiplier, will be valid only when Inverse time characteristic is selected	0.100	0.020-2.500	0.005
I e> > in I/In	Desired earth fault high set value in % of the rated current	2.0	2.0-6.0 I/In Disabled	0.1 I/In
I e>> Def Time	Definite time delay in seconds.	0.030	0.020-2.500 Sec	0.005 Sec
Reset Char	Over Current reset characteristic	Definite	Instantaneous Definite Curve	
Reset Delay	Over current reset time	0.10	0.10-10.00	0.01

Relay Standards	
Title	**Standard No.**
Electromagnetic Compatibility Type Test:	
High Frequency Test	: IEC 60255-22-1, class – III : Frequency : 1MHz Damped Oscillatory : Longitudinal :5 KV (peak) : Duration: sec duration 2 sec. : Between input current Terminal
Electrostatic Discharge Direct Application	: IEC 60255-22-2 Class III and IEC 61000-4-2 class III. : Contact discharge: 6kV, : Air discharge: 8KV : Polarity: both +ve and –Ve polarities.
Indirect Application	: IEC-61000-4-2, Class-III
Fast Transient Disturbance	: IEC 60255-22-4 and IEC 61000-4-4, class A : 1.2KV; 5/50ns; 5KHz burst duration = 15ms. : Repetition rate 300ms; Both polarities; Ri = 50W; duration 1 min.
Surge Immunity Test	: IEC 60255-22-5 / IEC 61000-4-6 class 4 : Differential Mode = 2kV : Common Mode = 4kV : 1.2/50uS , 5 surges of each polarity
Power Frequency Magnetic Field Test	: IEC-61000-4-8, Class-V
Radiated Electromagnetic Field Disturbance	: IEC- 60255-22-3 : EN-61000-4-3 : Frequency 80MHz – 1GHz
Conducted Disturbance Induced By Radio Frequency Field	: IEC 60255-22-6 / IEC 61000-4-6: 1996. : Freq. 150kHz – 80MHz, Amplitude 10 V, Modulation 80% AM @ 1 KHz
AC Ripple In DC Supply Test	: IEC 60255-11
Radiated Emission	: IEC 60255-25
Insulation Tests:	
High Voltage Test	: IEC 60255-5. class – III : At 2.5kV 50Hz between all terminal connected together and earth for 1 minutes

Impulse Voltage Test	: IEC 60255-5. class – III : Test voltage: 5KV (peak) 1.2 / 50us, : Energy :0.5 J, : Polarity : + ve and – Ve : Nos. of impulses : 3 positive and 3 negative impulse : Duration between Impulses : 5 sec.
Insulation Tests:	
Cold test Storage test	: IEC 60068-2-1
Dry heat test	: IEC 60068-2-2
Damp heat test, steady state	: IEC 60068-2-3
Damp heat test, cyclic	: IEC 60068-2-30
Mechanical tests	
Vibration	IEC 60255-21-1 class 1 Frequency Range = 10Hz – 150Hz , acceleration. 1gn (9.8m/s2) : Sweep rate 1 octave/min; 20 cycle in 3 orthogonal axis.
Bump Test	: IEC 60255-21-2 Class-1 : 1000 bumps of 10gn peak acceleration and 16ms pulse duration in each of the two opposite direction per axis as per IEC 60255-21-2 class 1 No. of axes . 3.
Shock Withstand	: IEC 60255-21-2 Clas-1 : 3 shocks of 15gn peak acceleration and 11ms pulse in each of two opposite direction . No. of axis : 3
Seismic Test	: IEC 60255-21-3 : In single axis sine sweep in X-axis sweep (@a sweep rate of 1 octave/minute) vibration in the frequency range (5-40 Hz) at amplitude of 3.5mm or 1.0gn (whichever is less) : In single axis sine sweep in Y-axis - sweep (@a sweep rate of 1 octave/minute) vibration in the frequency range (5-40 Hz) at amplitude of 1.5mm or 0.5gn (whichever is less)

E BLOCKING :

For any change in value, press **Up** switch and **Down** switch.
For next parameter, press **Next** Switch. We can also edit the previous parameter by pressing **Back** Switch. To save the parameter press, **Enter** key.

Display	Explanation of Parameter	Factory Setting	Setting Range
Block IE>	Earth fault protection is blocked if assigned blocking input is shorted to common.	Not Blocked	Not Blocked Block input 1 Block input 2 Block input 3 Block input 4
Block IE>>	High set earth fault protection is blocked if assigned blocking input is shorted to common.	Not Blocked	Not Blocked Block input 1 Block input 2 Block input 3 Block input 4

E ANNUNCIATION :

For any change in value, press **Up** switch and **Down** switch.
For next parameter, press **Next** Switch. We can also view the previous parameter by pressing **Back** Switch. To save the parameter press, **Enter** key.

Display	Explanation of Parameter	Factory Setting	Setting Range
Announce IE>	The earth fault will announce on selected contact.	Not Ann	A1/A2/A3 Not Ann Contact
Announce IE>>	The high set earth fault will announce on selected contact.	Not Ann	A1/A2/A3 Not Ann Contact

SET CLOCK :

To change the date & time, enter the 'SET CLOCK' mode in programming main menu by pressing Enter key.
LCD Shall display : **DD:MM:YYYY**
To set the date by pressing Up & Down key. Once the date set, press the Next switch
LCD Shall display : **DD:MM:YYYY**
To set month by pressing Up & Down key. Once the month set, press the Next switch
LCD Shall display : **DD:MM:YYYY**
To set the year by pressing Up & Down key. Once the year set, press the Next switch
LCD Shall display : **HH:MM:SS**
To set the hour by pressing Up & Down key. Once the hour set, press the Next switch
LCD Shall display : **HH:MM:SS**
To set minute by pressing Up & Down key.Once the minute set, press the Next switch
LCD Shall display : **HH:MM:SS**
To set the Second by pressing Up & Down key.
Press the Enter key to save the date and time.

RESET PASS :

To reset the password, enter the 'RESET PASS' mode in programming main menu by pressing Enter key
The display will show as : **Enter password 0**
Enter the current password by using the up arrow key and down arrow key. Press enter key.
The display will show as : **Change password 1**
Enter the new password wh by using the up arrow key and down arrow key. Press enter key.
The display will show as : **Press Inc to change Dec to ESC**
Press increment key If user want to change the password otherwise press decrement key.
The display will show as : **Password Updated**

V SYSTEM PARA :
To view the system parameter, enter the **'V SYSTEM PARA'** mode in programming main menu by pressing **Enter** key.
This mode is not password protected. In this mode, user can only view the setting of system parameter by pressing **Next** key & **Back** key. NO change in setting is allowed here. To exit this mode, press **Reset** key.

V PARAMETER :
To view the parameter set 1, enter the **'V PARA SET 1'** mode in programming main menu by pressing **Enter** key.
This mode is not password protected. In this mode, user can only view the setting of parameter set 1 by pressing **Next** key & **Back** key. NO change in setting is allowed here. To exit this mode, press **Reset** key.

V BLOCKING :
To view the blocking parameter, enter the **'V BLOCKING'** mode in programming main menu by pressing **Enter** key.
This mode is not password protected. In this mode, user can only view the setting of blocking parameter by pressing **Next** key & **Back** key. NO change in setting is allowed here. To exit this mode, press **Reset** key.

V ANNUNCIATION :
To view the annunciation parameter, enter the **'V ANNUNCIATION'** mode in programming main menu by pressing **Enter** key.
This mode is not password protected. In this mode, user can only view the setting of annunciation parameter by pressing **Next** key & **Back** key. NO change in setting is allowed here. To exit this mode, press **Reset** key.

V COMM SETTING :
To view the communication parameter, enter the **'V COMM SETTING'** mode in programming main menu by pressing **Enter** key.
This mode is not password protected. In this mode, user can only view the setting of communication parameter by pressing **Next** key & **Back** key. NO change in setting is allowed here. To exit this mode, press **Reset** key.

V HISTORY :

To view the fault history, enter the **'V HISTORY'** mode in programming main menu by pressing **Enter** key.
COP-N keeps a log of last 32 faults. In this mode, user can only view the record of last 32 faults with date and time stamp. Tripping records are updated on first in first out basis. To exit this mode, press **Reset** key.

V EVENT :

To view the display event, enter the **'V EVENT'** mode in programming main menu by pressing **Enter** key.
COP-N keeps a log of last 32 events. Setting change, password modified & RTC modified are considered as event. In this mode, user can only view the record of last 32 events with date and time stamp. Event records are updated on first in first out basis. To exit this mode, press **Reset** key.

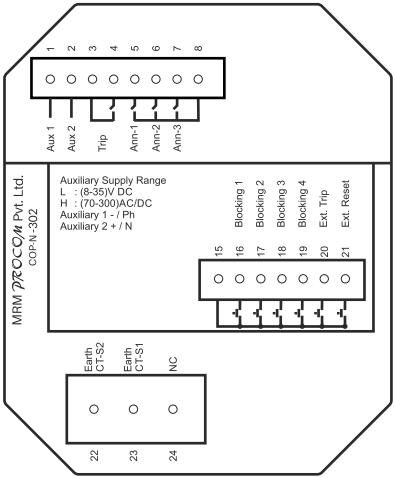
11.0 Tripping Characteristics :

S.NO.	Tripping Characteristic	Reset Time	Trip Time
1.	DEFT	The Reset time for DEFT characteristic is programmable in E PARA SET 1.	The Trip time for DEFT characteristic is programmable in E PARA SET 1.
2.	Normal Inverse 0.6	$t = \left\| \frac{0.028}{\left(\frac{I}{I>}\right)^{2} - 1} \right\| * tms$	$t = \left\| \frac{0.028}{\left(\frac{I}{I>}\right)^{0.02} - 1} \right\| * tms$
3.	Normal inverse 1.3	$t = \left\| \frac{0.061}{\left(\frac{I}{I>}\right)^{2} - 1} \right\| * tms$	$t = \left\| \frac{0.061}{\left(\frac{I}{I>}\right)^{0.02} - 1} \right\| * tms$
4.	THERM FLAT	$t = \left\| \frac{5 * 3^{2}}{\left(\frac{I}{In}\right)^{0}} \right\| * tms$	$t = \left\| \frac{5 * 1^{2}}{\left(\frac{I}{In}\right)^{0}} \right\| * tms$

5.	ANSI EINV	$t = \left\| \frac{29.1}{\left(\frac{I}{I>}\right)^2 - 1} \right\| * tms$	$t = \left(\frac{28.2}{\left(\frac{I}{I>}\right)^2 - 1} + 0.1217 \right) * tms$
6.	ANSI VINV	$t = \left\| \frac{21.6}{\left(\frac{I}{I>}\right)^2 - 1} \right\| * tms$	$t = \left(\frac{19.61}{\left(\frac{I}{I>}\right)^2 - 1} + 0.491 \right) * tms$
7.	ANSI MINV	$t = \left\| \frac{4.85}{\left(\frac{I}{I>}\right)^2 - 1} \right\| * tms$	$t = \left(\frac{0.0515}{\left(\frac{I}{I>}\right)^{0.02} - 1} + 0.114 \right) * tms$
8.	IEC EINV	$t = \left\| \frac{80}{\left(\frac{I}{I>}\right)^2 - 1} \right\| * tms$	$t = \left\| \frac{80}{\left(\frac{I}{I>}\right)^2 - 1} \right\| * tms$
9.	IEC LINV	$t = \left\| \frac{120}{\left(\frac{I}{I>}\right)^2 - 1} \right\| * tms$	$t = \left\| \frac{120}{\left(\frac{I}{I>}\right) - 1} \right\| * tms$
10.	IEC VINV	$t = \left\| \frac{13.5}{\left(\frac{I}{I>}\right)^2 - 1} \right\| * tms$	$t = \left\| \frac{13.5}{\left(\frac{I}{I>}\right) - 1} \right\| * tms$
11.	IEC NINV	$t = \left\| \frac{0.14}{\left(\frac{I}{I>}\right)^2 - 1} \right\| * tms$	$t = \left\| \frac{0.14}{\left(\frac{I}{I>}\right)^{0.02} - 1} \right\| * tms$
12.	I4T	$t = \left\| \frac{5 * 3^2}{\left(\frac{I}{In}\right)^0} \right\| * tms$	$t = \frac{5 * 3^4}{\left(\frac{I}{In}\right)^4} * tms$
13.	I2T	$t = \left\| \frac{5 * 3^2}{\left(\frac{I}{In}\right)^0} \right\| * tms$	$t = \frac{5 * 3^2}{\left(\frac{I}{In}\right)^2} * tms$
14.	IT	$t = \left\| \frac{5 * 3^2}{\left(\frac{I}{In}\right)^0} \right\| * tms$	$t = \frac{5 * 3^1}{\left(\frac{I}{In}\right)^1} * tms$

tms = Time Multiplier Setting

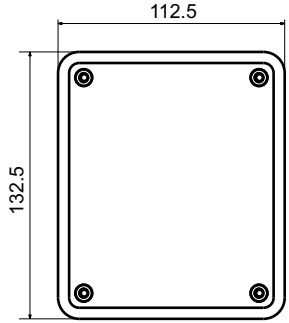
12.0 Connection Diagram / Terminal arrangement :



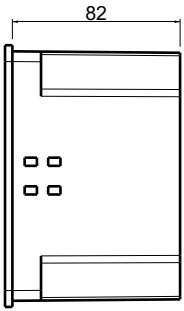
13.0 Technical specification :

Current withstand	10 times rated current
Drop Out To Pick Up Ratio	>97 %
Measurement Accuracy	
Voltage & Current	± 1%
Frequency	± 0. 05 Hz.
Power	± 1%
Surge 1.2/50Usec	2.5KV
Returning Time	30 ms
Time Lag Error Class Index E	±10 ms
Minimum Operating Time	30 ms
Transient Overreach At instantaneous Operation	<5%
Auxiliary voltage	60-300VDC & 50-300VAC
Cut out Dimensions	105mm X 125mm
Depth	90mm

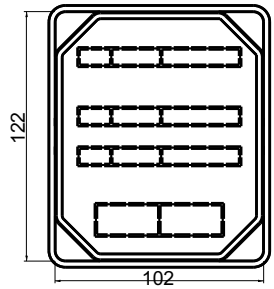
14.0 Dimensional Details :



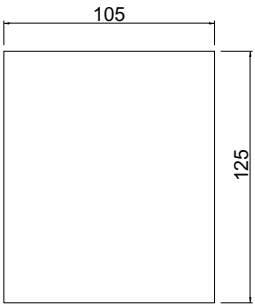
Front view



Right view



Back View



Cut Out

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