



PROCOM®

OPERATING INSTRUCTIONS COP-ADV

(ANSI CODE 27, 50, 50N, 50G, 50BF, 51, 51N, 51G, 51V, 59, 81U, 81O, 74TC)



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1.0 Introduction :

- The COP-ADV of Feeder Protection Relays are 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 Optional RS-485 Port is also Provided.
- Wide Auxiliary Supply(20-300 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 Date Recording
- RTC Stamp on Fault & Event
- Seven Digital Input
- Site Selectable 1A/5A CT Secondary Current
- Display in Primary/Secondary Values
- Wide Setting Range With Fine Setting Steps
- Front USB Port
- RS-485 communication Port with MODBUS protocol
- Self Supervision
- Remote Reset input

3.0 Digital Output :

COP Plus had upto seven NO Contact. Two is reserved for tripping function. Four are programmable for alarm function.

- Alarm 1 (NO Contact)
- Alarm 2 (NO Contact)
- Alarm 3 (NO Contact)
- Alarm 4 (NO Contact)
- Trip 2 (NO/NC Contact)
- Trip 1 (NO/NC Contact)
- Self Supervision Contact (NO Contact)

4.0 Display Parameter :

- Current
- Frequency
- Voltage

5.0 Digital Input :

COP-ADV had up to seven digital input.

- **Blocking Input** : Protection function can be blocked either by programming or using external blocking input. There are 4 blocking input and each can be assigned to set of the input protection function **U>**, **U>>**, **U<**, **U<<**, **I>**, **I>>**, **IE>**, **IE>>**, **REF>**, **REF>>**, **F>**, **F>>**, **F<**, **F<<**
.
- **Parameter Selection** : Pin open : Parameter set 1 (**E PARA SET 1**) is selected for the operation of the relay.
Pin short to common : Parameter set 2 (**E PARA SET 2**) select for the operation of the relay.
- **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.
- **TCS (NC)** : The **TCS (NC)** input is normally connect to the circuit breaker. When the relay senses a fault in trip circuit of breaker, it announce.
- **TCS (NO)** : The **TCS (NO)** input is normally connect to the circuit breaker. When the relay senses a fault in trip circuit of breaker, it announce.






6.0 Protection :




- | | |
|------------------------------|--------------------------------------|
| • Over Current Protection | • Short Circuit Current Protection |
| • Earth Fault Protection | • High set Earth Fault Protection |
| • Ground Fault Protection | • High set Ground Fault Protection |
| • Trip Current Supervision | • Circuit Breaker Failure Protection |
| • Over Voltage Protection | • High set Over Voltage Protection |
| • Under Voltage Protection | • High set Under Voltage Protection |
| • Over Frequency Protection | • High set Over Frequency Protection |
| • Under Frequency Protection | • Low set Under Frequency 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-ADV 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.
	Test Switch	Test Key is used for testing the unit, if the function is enabled in the settings.
	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	I	This led indicates an over current / short circuit fault.
2	IE	This led indicates an low set / high set earth & Ref fault
3	V>	This led indicates an low set / high set over voltage fault
4	V<	This led indicates an low set / high set under voltage fault.
5	F >	This led indicates an low set / high set over frequency fault.
6	F <	This led indicates an low set / high set under frequency fault.
7	TCS	This led indicates a trip circuit / circuit breaker Failure.
8	Trip	This led indicates a fault occurrence.

9.0 Display Measurement :

Graphical back-lit LCD Display is provided for parameter and setting display and for easy viewing of measurement, setting, fault and 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 :

VER

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

IR 0.0 %
IY 0.0 %
IB 0.0 %
IE 0.0 %

It will display the current in all phases and neutral current in % of rated 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.

IE 0.01 %
REF 0.01 %

It will display the earth and REF current in % of rated 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.

VRY 0.0 %
VYB 0.0 %
VBR 0.0 %

It will display the phase to phase voltage in % of rated voltage. 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.

F 0.0 Hz

It will display the frequency. 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.


20:48:10
18:07:2014

This will display the time and date.

10.0 Reset characteristics Testing

Curve	Tm	Trip Time I=55.3%	Reset Time I=0%	Start Time	Stop Time	Reset Char.
ANSI EINV	0.3	37.92	14.5	10	3	Curve
				15	4	
				7	7	
				6.1	10	
				38.1		
ANSI EINV	0.3	37.92	14.5	10	3	DEFT=5sec
				15	4	
				7	7	
				37.6	10	
ANSI EINV	0.3	37.92	14.5	10	3	DEFT=10sec
				15	4	
				7	7	
				6.5	10	
				38.5		
ANSI EINV	0.3	37.92	14.5	10	3	DEFT=10sec
				15	4	
				7	13	
				38.2	10	
ANSI VINV	0.5	44.2	10.8	10	5	Curve
				5	6	
				20	6	
				8.29	10	
				43.29		
ANSI VINV	0.5	44.2	10.8	10	5	Curve
				5	6	
				20	13	
				43.6	10	
ANSI MINV	0.5	12.8	2.4	3	0.5	Curve
				2	0.8	
				4	1	
				3.21	10	
				12.21		
ANSI MINV	0.5	12.8	2.4	3	0.5	Curve
				2	0.8	
				4	4	
				12.69	10	

11.0 Setting Procedure :

COP-ADV 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

E SYSTEM PARA
E PARA SET 1
E PARA SET 2
E BLOCKING

Press down key to select the “**E PARA SET 1**”
programming mode

E SYSTEM PARA
E PARA SET 1
E PARA SET 2
E BLOCKING

Press enter key to enter the programming sub menu

Enter Password
0

Press Up key to set the password which is default 123

Enter Password
123

Press enter key


I> in I/In
0.50

Press next key for next parameter



I> characteristic
DEFT

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



I> characteristic
IEC EINV

Programming Main Menu

E SYSTEM PARA
E PARA SET 1
E PARA SET 2
E BLOCKING
E ANNUNCIATION
E COMM SETTING
SET CLOCK
RESET PASS

V SYSTEM PARA
V PARA SET 1
V PARA SET 2
V BLOCKING
V ANNUNCIATION
V COMM SETTING
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
Phase CT Ratio	Ratio of current transformer, (Rated phase CT Primary current / Rated phase CT Secondary current)	1	1-9999	1
Earth CT Ratio	Ratio of current transformer, (Rated earth CT Primary current / Rated earth CT Secondary current)	1	1-9999	1
CT Secondary	Rated CT secondary current	5A	5A, 1A	

PT Ratio	Ratio of potential transformer, (Rated PT Primary voltage/ Rated PT Secondary voltage)	1	1-2000	1
I/P Connection	Voltage connection to the controller is selectable	230V -3P4W	110V - 1Ph 110V - 2Ph 110V - 3Ph 230V - 3P4W 400V - 3P-3W	
Trip Ckt Sup.	Trip Circuit supervision	Disabled	Enabled/disabled	
CB Failure Ann	Circuit Breaker Failure Protection	Disabled	Enabled/disabled	
CB F Delay	Delay time of CB	0.50	0.05-2.00	0.1
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	
EF Measure Type	Earth fault measurement method	51G ext earth CT	51G ext earth CT 51N internal cal.	
V OC Set	Over current fault based on voltage	V OC Disable	V OC Disable V OC Dependent V OC Restricted	
All voltage fail	To prevent fault if all voltage fail together	Disable	Enabled disabled	

E PARA SET 1 :

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.

Display	Explanation of parameter	Factory setting	Setting Range	Setting step
I > in I/In	Desired over current value in % of the rated current	0.50	0.1-10.00 I/In Disabled	0.01 I/In
I> Characteristic	Time delay characteristic for Over current .	DEFT	DEFT Normal Inv 0.6 Normal inv 1.3 I4T ,I2T ,IT THERM FLAT ANSI EINV ANSI VINV ANSI MINV IEC EINV IEC LINV IEC VINV IEC NINV	
I > 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 > Time Multiplier	Inverse time multiplier, will be valid only when Inverse time characteristic is selected.	0.100	0.020- 2.50	0.005

I >> in I/In	Desired short circuit current values in % of the rated current.	4.0	2-40.0 I/In Disabled	0.1 I/In
I >> Def Time	Definite time delay in seconds.	0.030	0.020 –2.000 Sec	0.005 Sec
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	IEC NINV	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	2.0-30.0 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

I Ref > In I/In	Desired reference fault values in % of the rated current.	1.00	0.06-1.00 Disabled	0.01
I Ref > Def I/In	Definite time delay in seconds.	15.000	0.020-15000 Disabled	0.005
I Ref >> In I/In	Desired high reference fault values in % of the rated current.	1.00	0.06-1.00 Disabled	0.01
I Ref >> Def I/In	Definite time delay in seconds.	15.000	0.020-15000 Disabled	0.005
Reset Char	Over Current reset characteristic	Definite	Instantaneous Definite Curve	
Reset Delay	Over current reset time	0.10	0.10-10.00	0.01
Cold Load	Cold load	Disabled	Enabled Disabled	
Cold Load Time	After expiry of this time cold load function is disabled.	10	1-120 min	1

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/s ²) : 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)
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Cold Load Mult	Cold load multiplier	1.0	1.0-4.0	0.01
UV< in V/Vn	Under Voltage low set value in % of rated voltage	0.80	0.40-1.00 V/Vn Disable	0.01 V/Vn
UV< Def Time	Definite time delay in seconds.	1.0 Sec	0.03-20.00 Sec	0.01 Sec
UV<< in V/Vn	Under Voltage high set value in % of rated voltage.	0.60	0.40-1.00 V/Vn Disable	0.01 V/Vn
UV<< Def Time	Definite time delay in seconds.	0.10	0.01-20.00 Sec	0.01 Sec
OV> in V/Vn	Over Voltage low set value in % of rated Voltage.	1.10	0.80-1.70 V/Vn Disable	0.01 V/Vn
OV> Def Time	Definite time delay in seconds.	1.0 Sec	0.01-20.00 Sec	0.01 Sec
OV>> in V/Vn	Over Voltage high set value in % of rated Voltage	1.20	0.80-1.70 V/Vn Disable	0.01 V/Vn
OV >> Def Time	Definite time delay in seconds.	0.10	0.01-20.00 Sec	0.01 Sec
Voltage Hys	Voltage hysteresis for reseting under/over voltage.	3%	1-25%	1%

V DEP I>	Desired over current value in % of the rated current depending on voltage	0.50	0.09-10.00	0.01
V DEP I>>	Desired short current value in % of the rated current depending on voltage	4.0	1.9-40.0	0.1
V DEP V<	Under Voltage low set value in % of rated voltage depending on which OC & SC current fault occurs.	0.90	0.39-1.00	0.01
V DEP V<<	Under Voltage high set value in % of rated voltage depending on which OC & SC current fault occurs.	0.30	0.39-1.00	0.01
V DEP K	multiplying factor for voltage dependent current	0.50	0.49-0.90	0.01
Power on UV Pick	After UV Healthy: under voltage function will be activated if voltage once crosses 50% of voltage UV Monitor P-ON: under voltage function will be activated as soon as the unit is power on.	After UV Healthy	After UV Healthy UV Monitor P-ON	
UF<	Under Frequency low set value.	48.50	45.00-70.00 Disable	0.01
UF< Def Time	Definite time delay in seconds.	3.0 Sec	0.06-30.00 Sec	0.01 Sec
UF<<	Under Frequency high set value.	48.00	45.00-70.00 Disable	0.01

UF << Def Time	Definite time delay in seconds.	1.0 Sec	0.06 – 30.00 Sec	0.01 Sec
OF >	Over Frequency low set value	51.0	45.00-70.00 Disable	0.01
OF > Def Time	Definite time delay in seconds.	3.0 Sec	0.06–30.00 Sec	0.01 Sec
OF >>	Over Frequency high set value.	52.00	45.00-70.00 Disable	0.01
OF >> Def Time	Definite time delay in seconds.	1.0	0.06–30.00 Sec	0.01 Sec
Block Vol V/Vn	Lower limit of input voltage, below which frequency measurement is blocked	0.60	0.60-0.90	0.01
Frequency Hys	Frequency hysteresis for resetting under/over Frequency.	1.0	1.0-10.0	0.1
No of Cycles Avg	No of cycles for which frequency is measured for fault detection.	10	2-50	1

E PARA SET 2 :

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.

The parameter of **E PARA SET 1 & E PARA SET 2** is similar.

If **parameter selection** input open then Parameter set 1 (**E PARA SET 1**) is selected for the operation of the relay.

If **parameter selection** input short to common then Parameter set 2 (**E PARA SET 2**) selected for the operation of the relay.

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 I>	Over current 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 I>>	Short circuit 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>	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
Block REF>	Reference 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 REF>>	High Reference 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 U>	Low set over voltage 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 U>>	High set over voltage 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 U<	Low set under voltage 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 U<<	High set under voltage protection is blocked by activating the Block input 1/2/3/4.	Not Blocked	Not Blocked Block input 1 Block input 2 Block input 3 Block input 4
Block F>	Low set over frequency protection is blocked by activating the Block input 1/2/3/4.	Not Blocked	Not Blocked Block input 1 Block input 2 Block input 3 Block input 4
Block F>>	High set over frequency protection is blocked by activating the Block input 1/2/3/4.	Not Blocked	Not Blocked Block input 1 Block input 2 Block input 3 Block input 4
Block F<	Low set under frequency protection is blocked by activating the Block input 1/2/3/4.	Not Blocked	Not Blocked Block input 1 Block input 2 Block input 3 Block input 4
Block F<<	High set under frequency protection is blocked by activating the Block input 1/2/3/4.	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 I>	The over current fault will announce on selected contact.	Not Ann	A1/A2/A3/A4/ Not Ann Contact
Announce I>>	The short circuit current fault will announce on selected contact.	Not Ann	A1/A2/A3/A4/ Not Ann Contact
Announce IE>	The earth fault will announce on selected contact.	Not Ann	A1/A2/A3/A4/ Not Ann Contact
Announce IE>>	The high set earth fault will announce on selected contact.	Not Ann	A1/A2/A3/A4/ Not Ann Contact
Announce Ref>	The Reference fault will announce on selected contact.	Not Ann	A1/A2/A3/A4/ Not Ann Contact
Announce Ref>>	The high set Reference fault will announce on selected contact.	Not Ann	A1/A2/A3/A4/ Not Ann Contact
Announce V>	The over voltage fault will announce on selected contact.	Not Ann	A1/A2/A3/A4/ Not Ann Contact
Announce V>>	The high set over voltage fault will announce on selected contact.	Not Ann	A1/A2/A3/A4/ Not Ann Contact
Announce V<	The under voltage fault will announce on selected contact.	Not Ann	A1/A2/A3/A4/ Not Ann Contact
Announce V<<	The low set under voltage fault will announce on selected contact.	Not Ann	A1/A2/A3/A4/ Not Ann Contact

Announce F>	The over frequency fault will announce on selected contact.	Not Ann	A1/A2/A3/A4/ Not Ann Contact
Announce F>>	The high set over frequency fault will announce on selected contact.	Not Ann	A1/A2/A3/A4/ Not Ann Contact
Announce F<	The under frequency fault will announce on selected contact.	Not Ann	A1/A2/A3/A4/ Not Ann Contact
Announce F<<	The low set under frequency fault will announce on selected contact.	Not Ann	A1/A2/A3/A4/ Not Ann Contact
Ann CB Failure	The circuit breaker failure fault will announce on selected contact.	On A2 Contact	A1/A2/A3/A4/ Not Ann Contact
Ann Trip Ckt	The trip circuit failure fault will announce on selected contact.	On A4 Contact	A1/A2/A3/A4/ Not Ann Contact

E COMM SETTING :

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.

S. No	Display	Explanation of parameter	Factory setting	Setting Range
1.	Device Id	Device Identification Number	1	1-247
2.	Baud Rate	Communication Baud Rate	9600	1200 2400 4800 9600
3.	Parity	Communication Parity Bit	NONE	NONE EVEN ODD
4.	Stop Bits	Communication Stop Bit	1	1-2

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 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 PARA SET 1 :

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 PARA SET 2 :

To view the parameter set 2, enter the '**V PARA SET 2**' 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 2 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 PLUS keeps a log of last 10 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 PLUS 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.

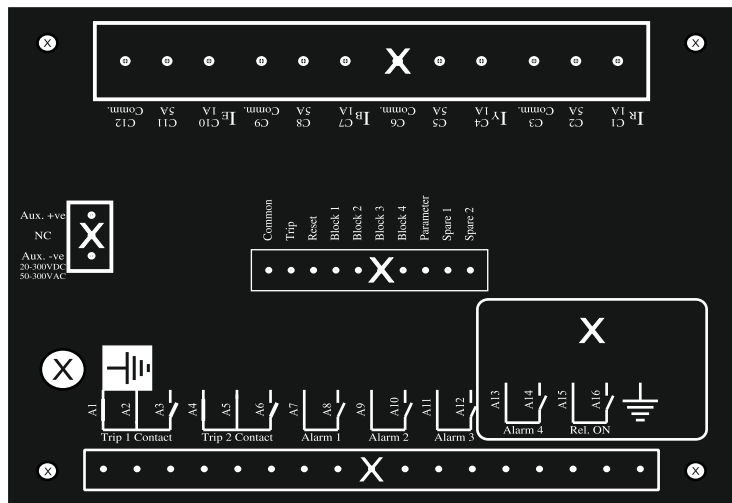
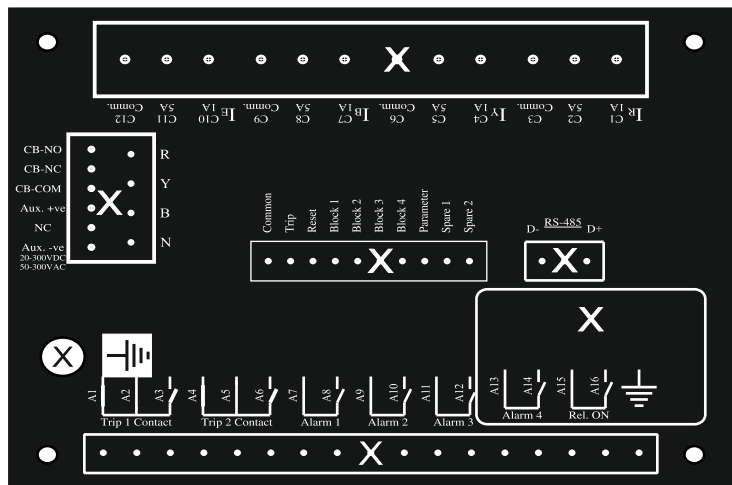
12.0 Tripping Characteristics :

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	$t = \left \frac{0.061}{\left(\frac{I}{I>}\right)^2 - 1} \right * tms$	$t = \left \frac{0.061}{\left(\frac{I}{I>}\right)^{-1} - 1} \right * tms$
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	$t = \left \frac{29.1}{\left(\frac{I}{I>}\right)^2} - 1 \right * tms$	$t = \left(\frac{28.2}{\left(\frac{I}{I>}\right)^2} + 0.1217 \right) * tms$
6.	ANSI VINV	$t = \left \frac{21.6}{\left(\frac{I}{I>}\right)^2} - 1 \right * tms$	$t = \left(\frac{19.61}{\left(\frac{I}{I>}\right)^2} + 0.491 \right) * tms$
7.	ANSI MINV	$t = \left \frac{4.85}{\left(\frac{I}{I>}\right)^2} - 1 \right * tms$	$t = \left(\frac{0.0515}{\left(\frac{I}{I>}\right)^{0.02}} + 0.114 \right) * tms$
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	$t = \left \frac{120}{\left(\frac{I}{I>}\right)^2} - 1 \right * tms$	$t = \left \frac{120}{\left(\frac{I}{I>}\right)^2} - 1 \right * tms$
10.	IEC VINV	$t = \left \frac{13.5}{\left(\frac{I}{I>}\right)^2} - 1 \right * tms$	$t = \left \frac{13.5}{\left(\frac{I}{I>}\right)^2} - 1 \right * tms$
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	$t = \left \frac{5*3^2}{\left(\frac{I}{In}\right)^0} - 1 \right * tms$	$t = \frac{5*3^4}{\left(\frac{I}{In}\right)^4} * tms$
13.	I2T	$t = \left \frac{5*3^2}{\left(\frac{I}{In}\right)^0} - 1 \right * tms$	$t = \frac{5*3^2}{\left(\frac{I}{In}\right)^2} * tms$
14.	IT	$t = \left \frac{5*3^2}{\left(\frac{I}{In}\right)^0} - 1 \right * tms$	$t = \frac{5*3^1}{\left(\frac{I}{In}\right)^1} * tms$

tms = Time Multiplier Setting

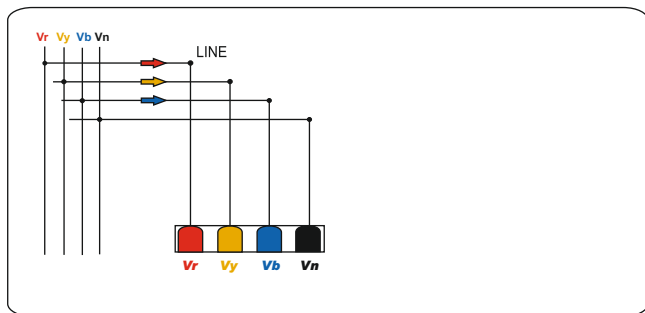
13.0 Connection Diagram / Terminal arrangement :



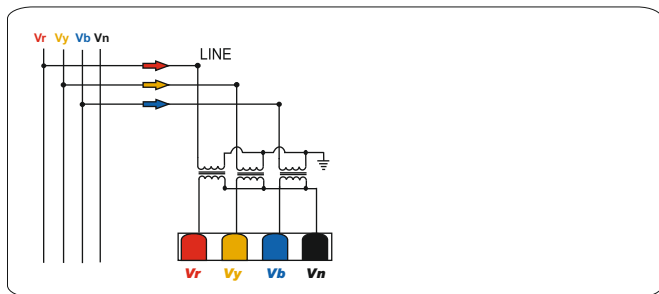
14. Wiring Diagrams

14.1 Voltage connection

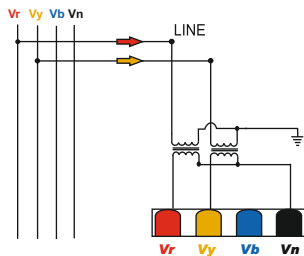
230 V 3-Phase 4-wire connection



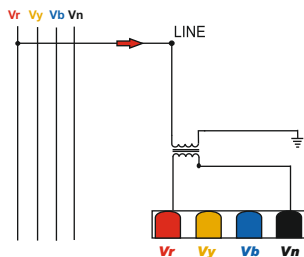
400 V 3-Ph 4-W, 110 V 3Ph



110 V 2Ph

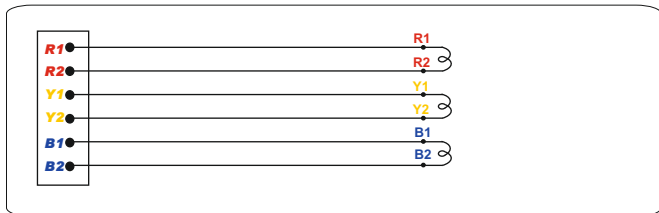


110 V 1Ph

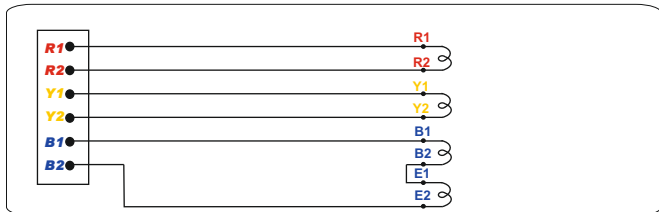


14.2 Current Connection

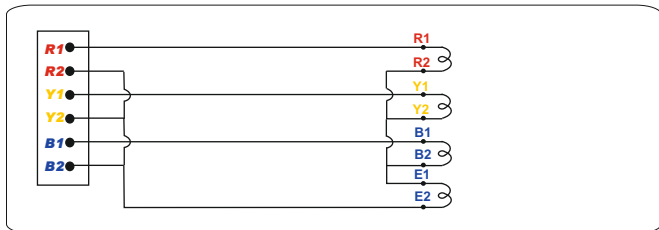
51N INTERNAL CAL.



51G EXTERNAL EARTH CT



64 REF



15.0 Technical specification :

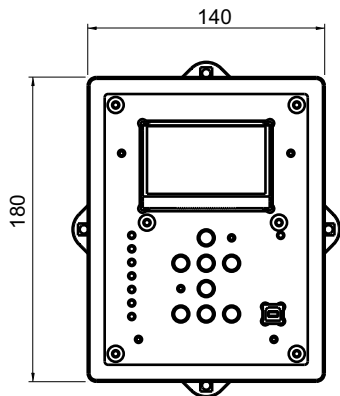
Voltage Burden	<0.1VA	
Voltage withstand	2 times rated current	
Rated Current	1A /5A	
Current withstand	10 times rated current	
Drop Out To Pick Up Ratio	>97 %	
Power consumption in current circuit	at $I_n = 1A$	0.2VA
	at $I_n = 5A$	0.1VA
Measurement Accuracy		
Voltage & Current	$\pm 1\%$	
Frequency	$\pm 0.05 \text{ Hz.}$	
Power	$\pm 1\%$	
Surge 1.2/50Usec	2.5KV	
Returning Time	30 ms	
Time Lag Error Class Index E	$\pm 10 \text{ ms}$	
Minimum Operating Time	30 ms	
Transient Overreach At instantaneous Operation	<5%	
Auxiliary voltage	20-300VDC & 50-300VAC	
Frequency Range	40-70 Hz	
Contact Rating	230 VAC, 5A	
Cut out Dimensions	166.5mm X 126.5mm	
Depth	74.5mm	

16.0 Model Selection

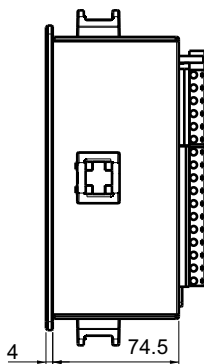
Protection	ANSI	Rated Voltage AC	RS-485 Comm	Description Model
TWO STAGE OVER & UNDER VOLTAGE RELAY, ZERO SEQUENCE & UNBALANCE VOLTAGE RELAY	27, 59, 59N	230/440	-	COP-ADV-1300-230
		110	✓	COP-ADV-1301-230
		230/440	-	COP-ADV-1300-110
		110	✓	COP-ADV-1301-110
IDMT OVER CURRENT, SHORT CIRCUIT & EARTH FAULT WITH HIGH SET RELAY	50, 51, 50N, 51N, CBFP	-	-	COP-ADV-4020
		-	✓	COP-ADV-4021
RESTRICTED EARTH FAULT RELAY	64R	-	-	COP-ADV-5020
		-	✓	COP-ADV-5021
TWO STAGE OVER VOLTAGE UNDER VOLTAGE, IDMT OVER CURRENT, SHORT CIRCUIT & EARTH FAULT WITH HIGH SET RELAY	27, 59, 50, 51, 50N, 51N, CBFP	230/440	-	COP-ADV-4120-230
		110	✓	COP-ADV-4121-230
		230/440	-	COP-ADV-4120-110
		110	✓	COP-ADV-4121-110
COMBINE OVER & UNDER VOLTAGE, OVER & UNDER FREQUENCY, IDMT OVER CURRENT, SHORT CIRCUIT & EARTH FAULT RELAY	27, 59, 81O, 81V, 50, 51, 50N, 51N, CBFP	230/440	-	COP-ADV-4620-230
		110	✓	COP-ADV-4621-230
		230/440	-	COP-ADV-4620-110
		110	✓	COP-ADV-4621-110

COMBINE OVER & UNDER VOLTAGE, OVER, UNDER FREQUENCY, IDMT OVER CURRENT SHORT CIRCUIT, EARTH FAULT & RESTRICTED EARTH FAULT RELAY	27, 59, 81O, 81V, 50, 51, 50N, 51N, 64R, CBFP	230/440	-	COP-ADV-6120-230
		110	✓	COP-ADV-6121-230
		230/440	-	COP-ADV-6120-110
		110	✓	COP-ADV-6121-110
COMBINE OVER & UNDER VOLTAGE, OVER & UNDER FREQUENCY, IDMT OVER CURRENT, SHORT CIRCUIT, EARTH FAULT, RESTRICTED EARTH FAULT & REVERSE POWER RELAY	27, 59, 81O, 81V, 50, 51, 50N, 51N, 64R, 32, CBFP	230/440	-	COP-ADV-6820-230
		110	✓	COP-ADV-6821-230
		230/440	-	COP-ADV-6820-110
		110	✓	COP-ADV-6821-110
COMBINE OVER & UNDER VOLTAGE, VOLTAGE DEPENDENT & RESTRICTED CURRENT OVER & UNDER FREQUENCY, IDMT OVER CURRENT, SHORT CIRCUIT, EARTH FAULT, RESTRICTED EARTH FAULT & REVERSE POWER RELAY	27, 59, 81O, 81V, 51V, 50, 51, 50N, 51N, 64R 32, CBFP	230/440	-	COP-ADV-7120-230
		110	✓	COP-ADV-7121-230
		230/440	-	COP-ADV-7120-110
		110	✓	COP-ADV-7121-110

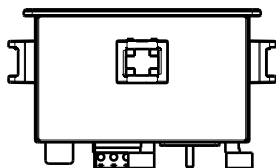
17.0 Dimensional Details :



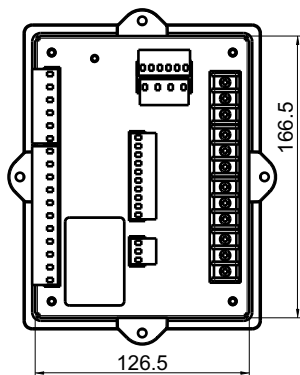
Front view



Right view



Bottom view



Back View

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