Operating Manual

PROTECTION *Relay*

DIGITAL PROTECTION RELAY

Programmable Multi-function Relay
Installation & Operating Instructions

Section Contents

1. INTRODUCTION

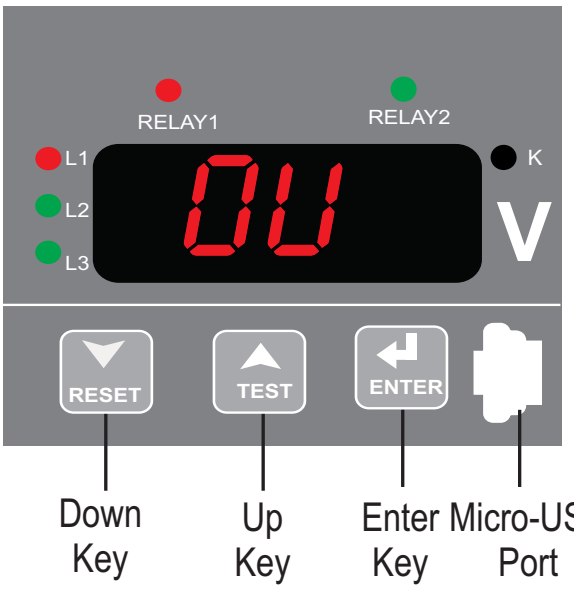
Voltage Relay: -

The Multifunction Voltage Relay measures electrical parameters like AC voltage, Frequency in 3 ph 4 wire, 3 ph 3 wire, 1 ph 2 wire Network and can be used to protect against Over Voltage, Under Voltage, Phase Unbalance, Phase Sequence detection, Phase Failure detection, Under Frequency, Over Frequency conditions.

Current Relay: -

The Multifunction Current Relay measures electrical parameters like AC Current, Frequency in 3 ph 4 wire, 3 ph 3 wire, 1 ph 2 wire Network and can be used to protect against Over Current, Under Current, Current Unbalance, Current Loss.

The Voltage / Current Relays integrate accurate measurement technology with 4 Digit 7 Segment LED Display & measure distorted waveform up to 15thharmonics.

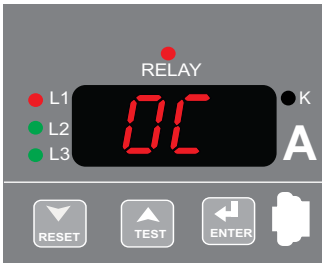


The Voltage / Current Relay can be configured & programmed on site for system type, PT / CT Primary, PT / CT Secondary in 3 Phase 3W, 3 Phase 4W, 1 Phase 2W System.

The front panel has three push button keys namely Reset / Down, Test / Up, Enter.

The Micro-USB port must be used for Modbus communication via USB-based PRKAB.

1.1 Display and Operating Elements

Meter Front	Element	Colour	Significance
Three Phase:   **Single Phase:**   	L1 L2 L3	Bi-colour (Green / Red)	Phase 1 LED indication Phase 2 LED indication Phase 3 LED indication **LED States -** Green - Healthy State Green (Flashing) - Reset Delay Red - Fault present on particular phase Red (Flashing) - Trip Delay OFF - Input Absent
	RELAY 1 RELAY 2 RELAY	Bi-colour (Green / Red)	RELAY 1 LED (1CO+1CO only) RELAY 2 LED (1CO+1CO only) RELAY LED (1CO/2CO only) **LED States -** Green - Healthy State Red - Fault / Alarm present
	K	Red	X1000 Indication
	RESET / ▼	-	RESET / DOWN Key (< 3 sec): Decrement values, move downwards in menu RESET / Down Key (> 3 sec): Reset relay in manual reset mode
	TEST / ▲	-	TEST/UP Key (<3 sec): Increment values, move upwards in menu TEST / UP Key (> 3 sec): Switch relay contacts, resets to initial position when released
	ENTER / ↵	-	ENTER Key (< 3 sec): Confirm values, menu level changes ENTER Key (> 3 sec): Enter Setup mode

1.2 Models

1.2.1 Voltage Relay

Features	Line Monitoring Relay	Voltage Protection Relay
Over Voltage	✓	✓
Under Voltage	✓	✓
Phase Failure	✓	✓
Phase Reversal	✓	✓
Over Frequency	✓	X
Under Frequency	✓	X
Phase Unbalance	✓	X

1.2.1 Current Relay

Features	Current Protection Relay
Over Current	✓
Under Current	✓
Current Loss	✓
Current Unbalance	✓

✓ Available
X Not available

2. MEASUREMENT PARAMETERS

In normal operation, the user is presented with one of the measurement reading screens out of several screens. These screens may be scrolled through one at a time in incremental order by pressing the " ▲" key and in decremental order by pressing " ▼ " key.

TABLE 1 (A):
Measured Parameters of Current Relay System Wise:

Measured Parameters	Units	3P 3W	3P 4W	1P 2W
System Current	Ampere	✓	✓	X
Current L1,L2,L3	Ampere	✓	✓	✓(Only L1)
System Frequency	Hz	✓	✓	✓
High / Low System Current	Ampere	✓	✓	✓
High / Low System Frequency	Hz	✓	✓	✓

TABLE 1 (B):
Measured Parameters of Voltage Relay System Wise:

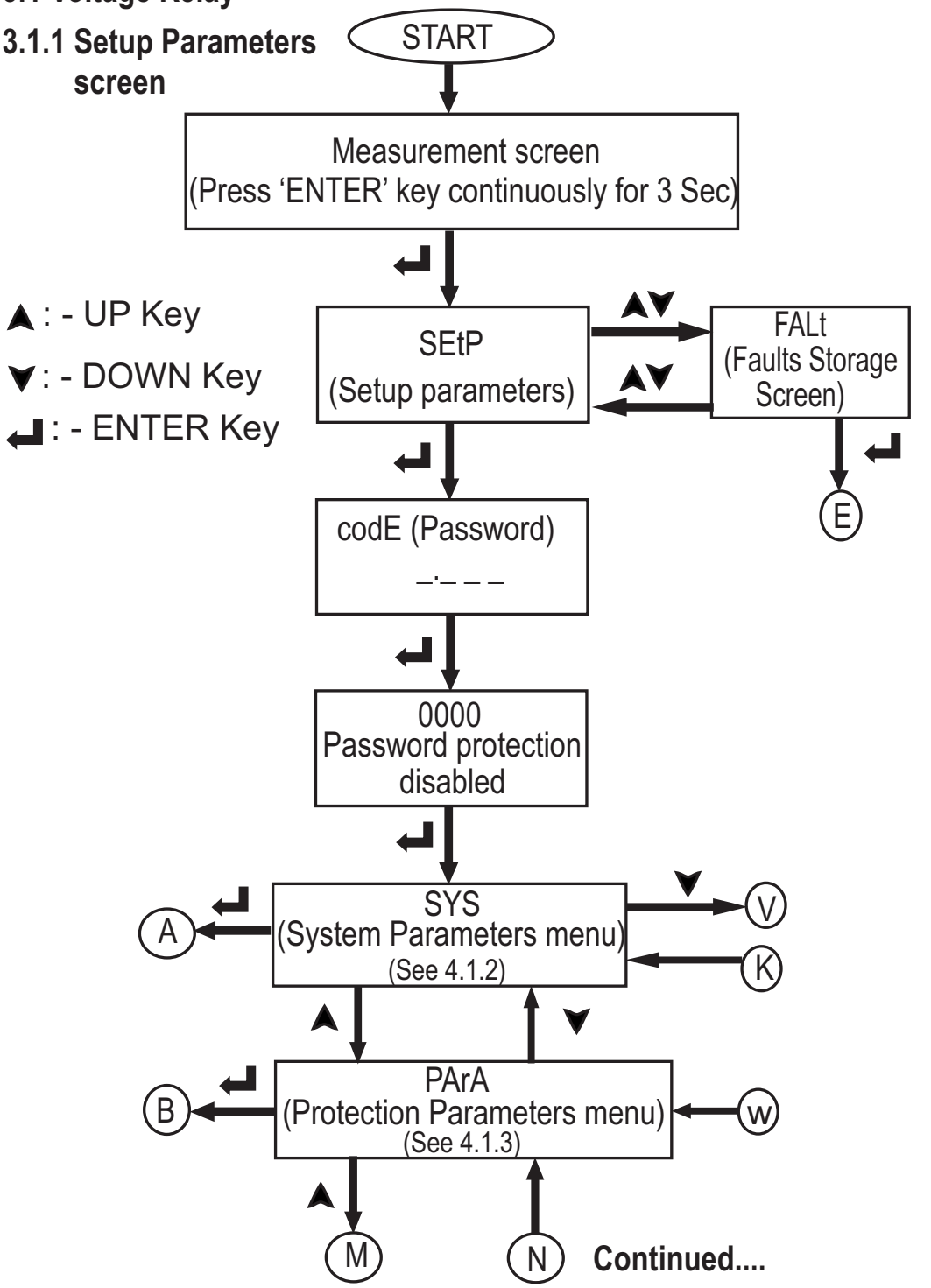
Measured Parameters	Units	3P 3W	3P 4W	1P 2W
System Voltage	Volt	✓	✓	X
Voltage V L1-N, VL2-N,VL3-N	Volt	X	✓	✓(Only L1-N)
Voltage VL1-VL2, VL2-VL3, VL3-VL1	Volt	✓	✓	X
System Frequency	Hz	✓	✓	✓
High / Low System Voltage	Volt	✓	✓	✓
High / Low System Frequency	Hz	✓	✓	✓

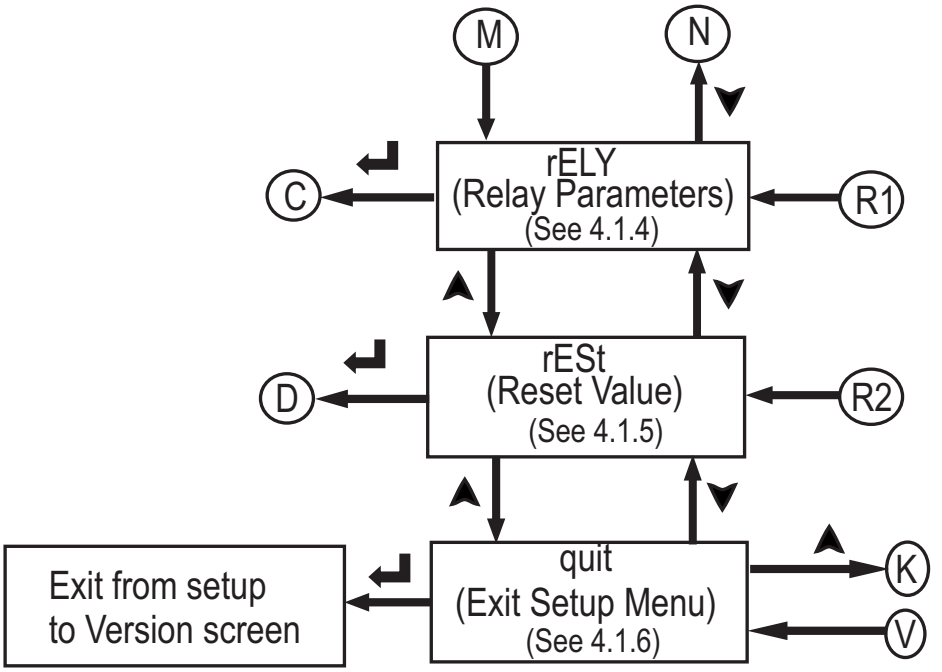
✓ Available
X Not available

3. FLOW DIAGRAMS

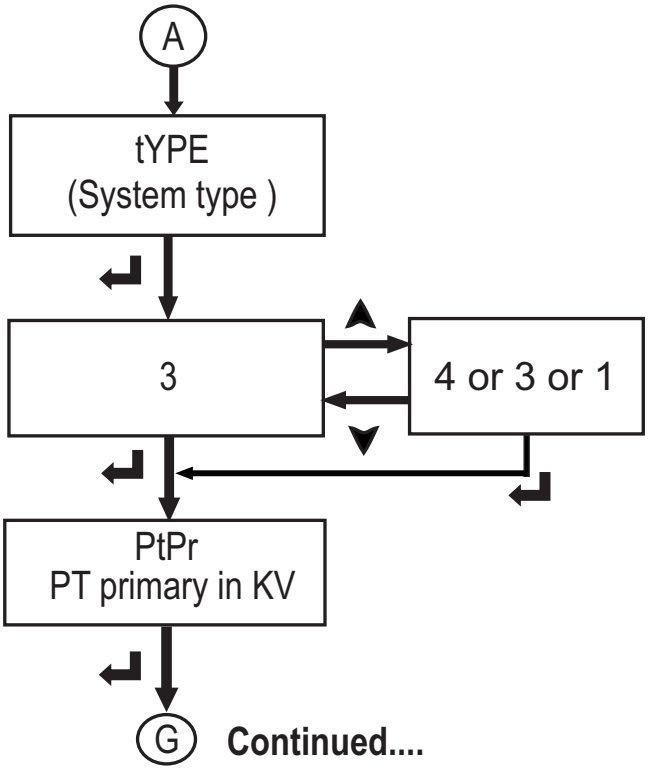
3.1 Voltage Relay

3.1.1 Setup Parameters screen

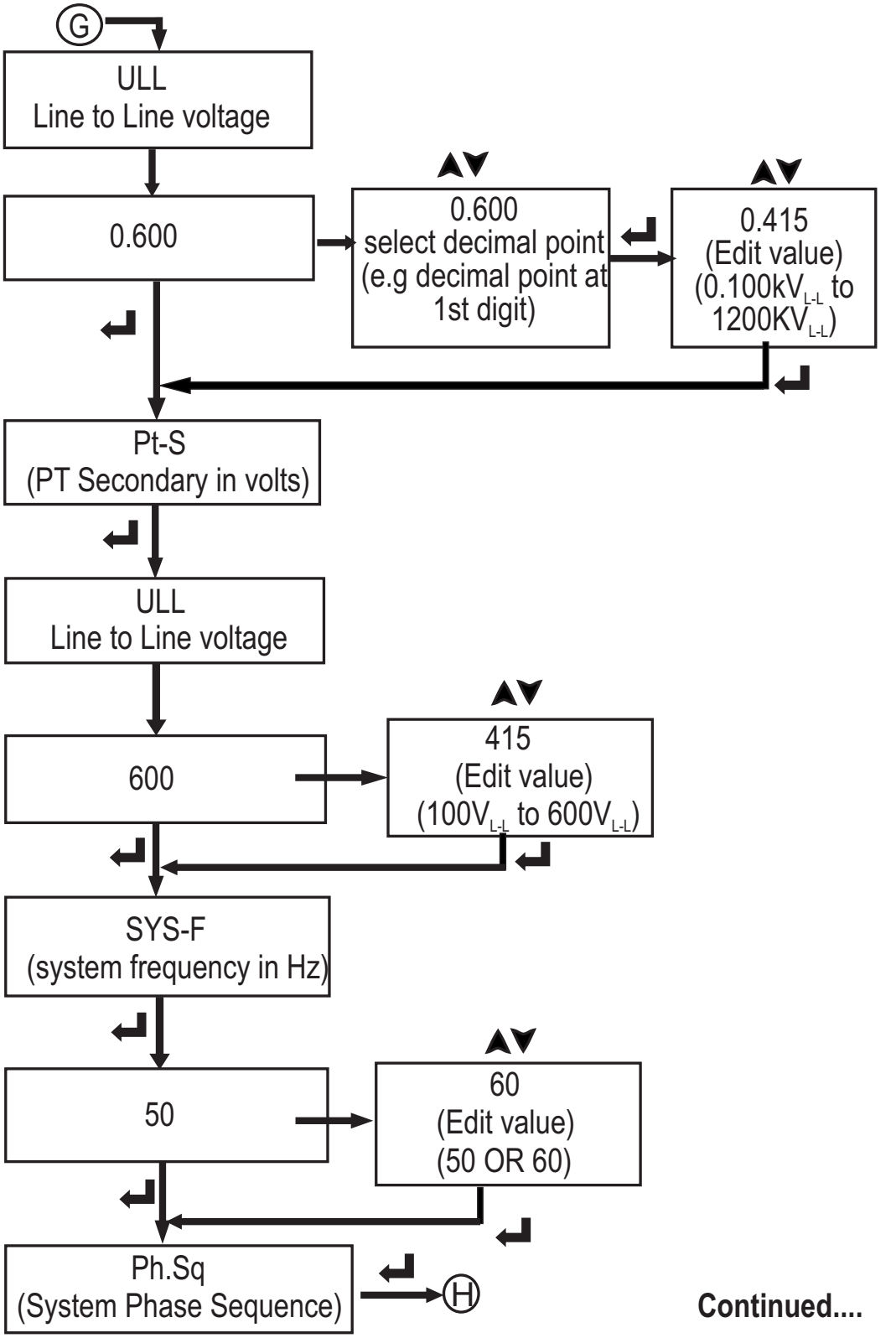




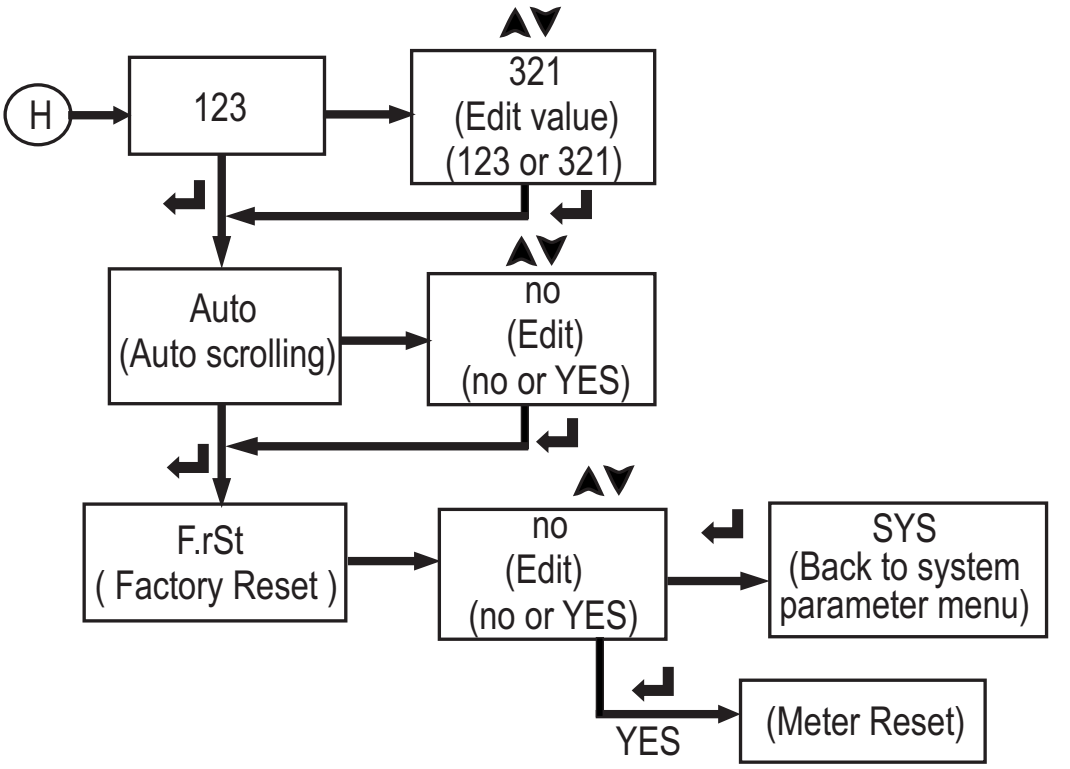
A] SYS (System Parameters Menu)



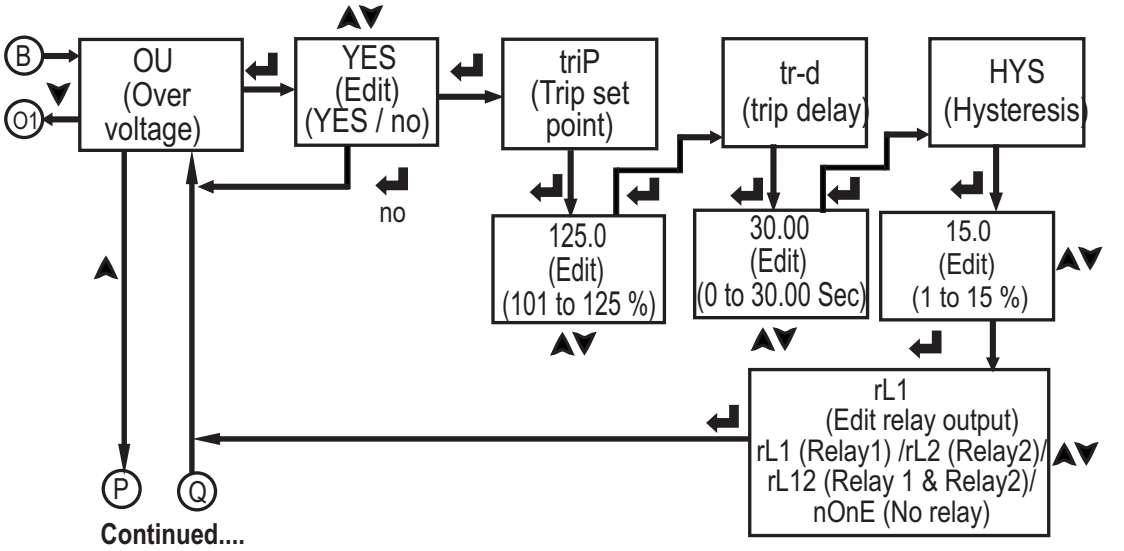
Continued....


G
ULL
Line to Line voltage
0.600
0.600
select decimal point
(e.g decimal point at
1st digit)
0.415
(Edit value)
(0.100kV L-L to
1200KV L-L)
Pt-S
(PT Secondary in volts)
ULL
Line to Line voltage
600
415
(Edit value)
(100V L-L to 600V L-L)
SYS-F
(system frequency in Hz)
50
60
(Edit value)
(50 OR 60)
Ph.Sq
(System Phase Sequence)
H

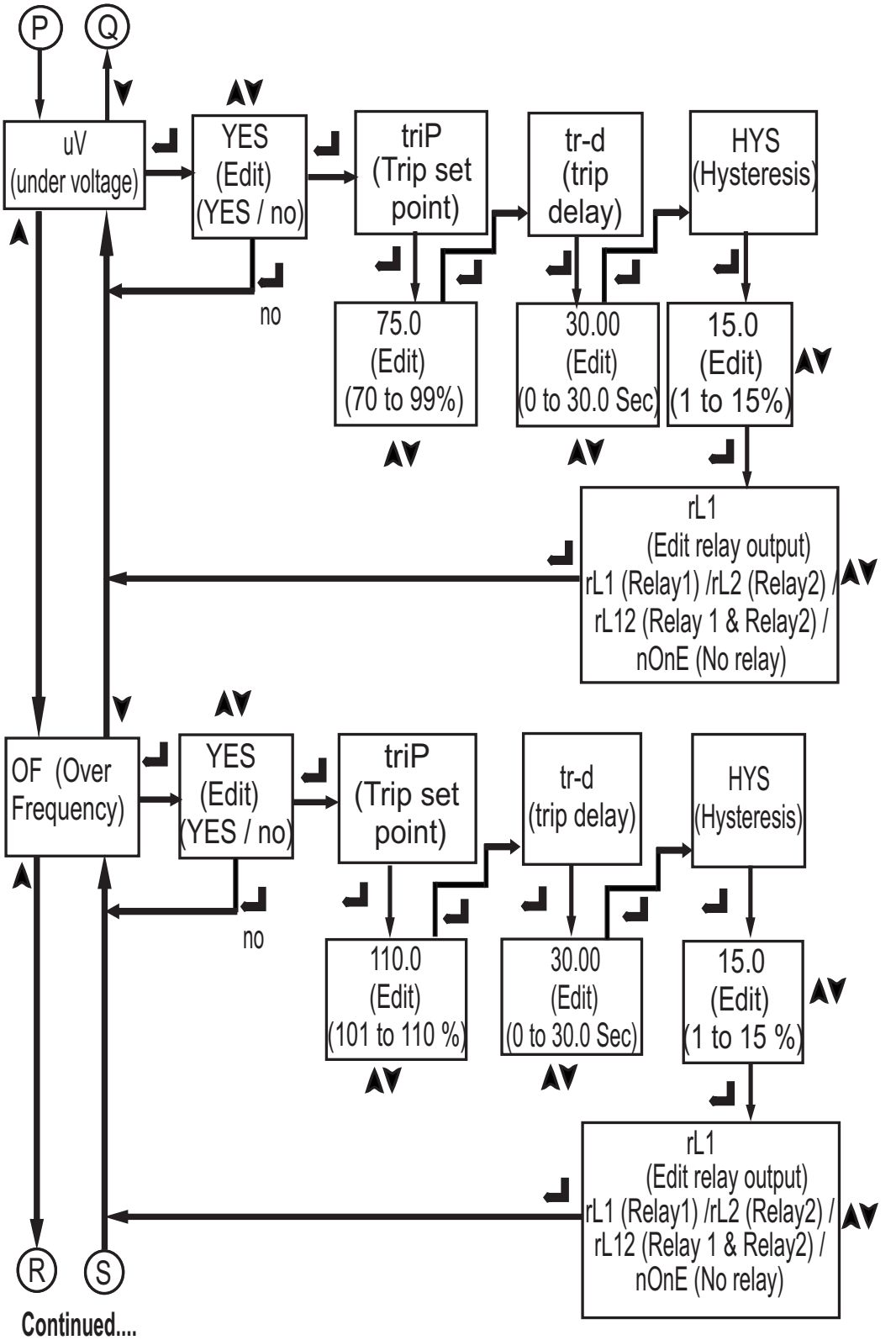
Continued....



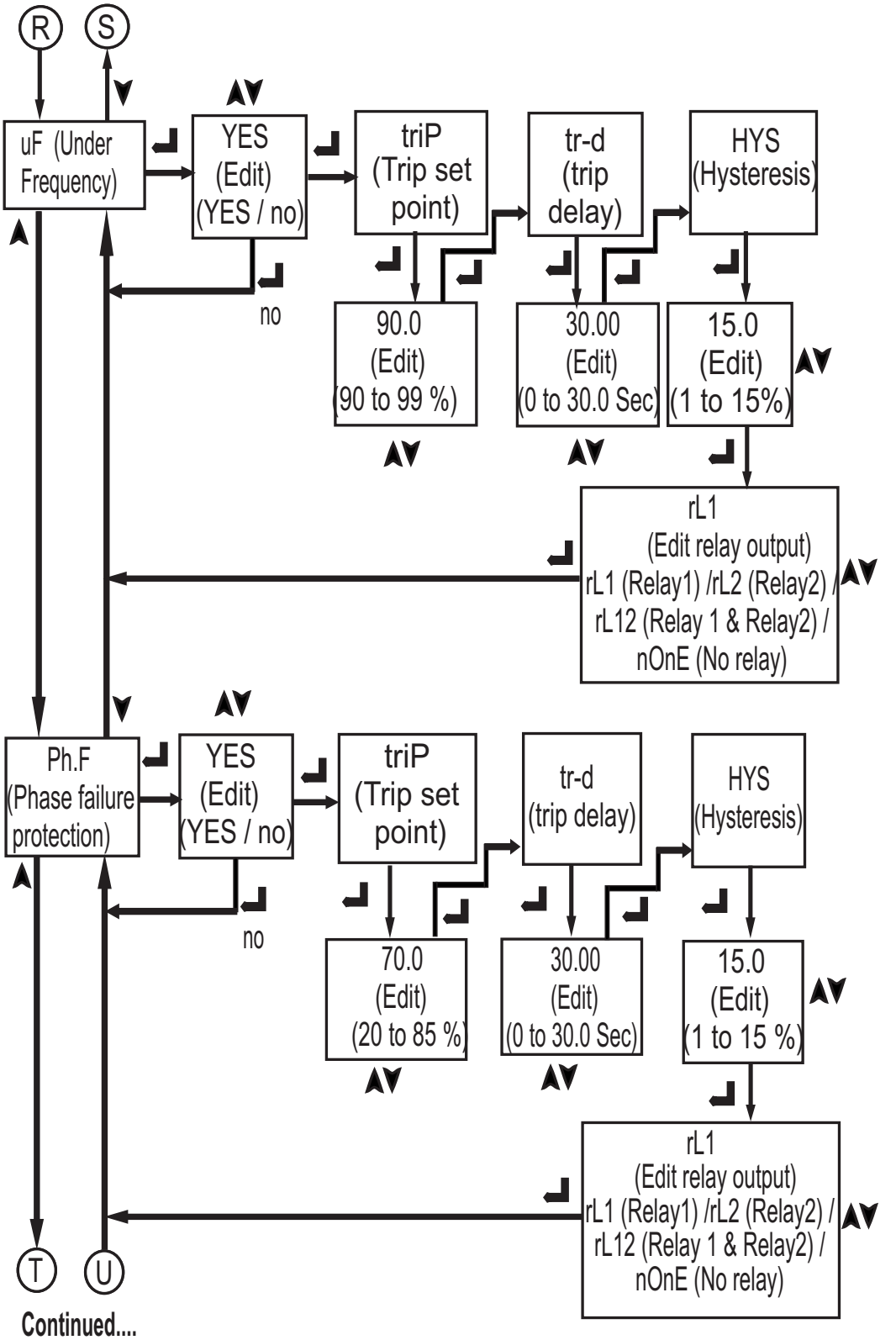
B] PArA (Protection Parameters Menu)



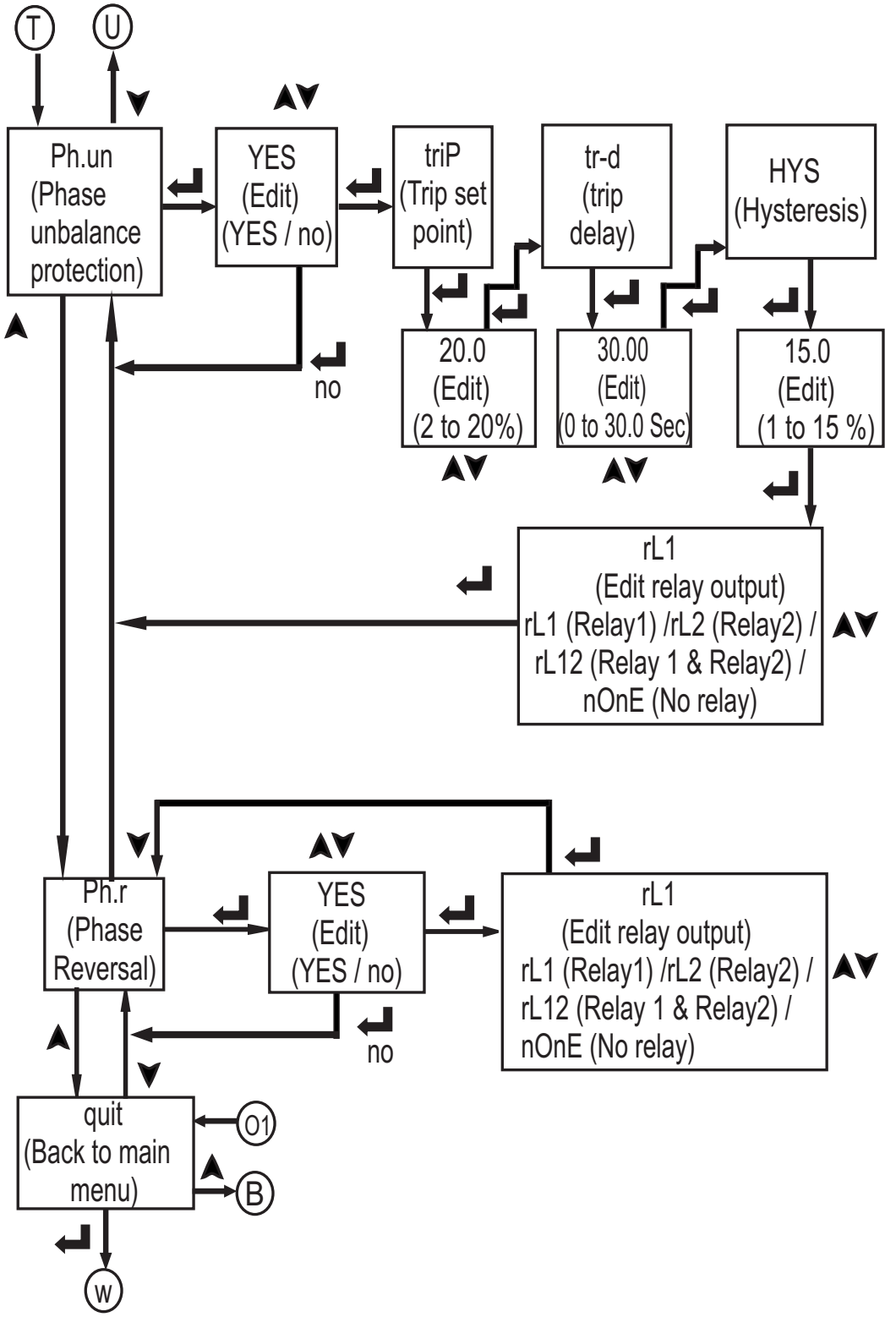
Continued....


P
Q
uV
(under voltage)
YES
(Edit)
(YES / no)
triP
(Trip set
point)
tr-d
(trip
delay)
HYS
(Hysteresis)
no
75.0
(Edit)
(70 to 99%)
30.00
(Edit)
(0 to 30.0 Sec)
15.0
(Edit)
(1 to 15%)
rL1
(Edit relay output)
rL1 (Relay1) /rL2 (Relay2) /
rL12 (Relay 1 & Relay2) /
nOnE (No relay)
OF (Over
Frequency)
YES
(Edit)
(YES / no)
triP
(Trip set
point)
tr-d
(trip delay)
HYS
(Hysteresis)
no
110.0
(Edit)
(101 to 110 %)
30.00
(Edit)
(0 to 30.0 Sec)
15.0
(Edit)
(1 to 15 %)
rL1
(Edit relay output)
rL1 (Relay1) /rL2 (Relay2) /
rL12 (Relay 1 & Relay2) /
nOnE (No relay)
R
S

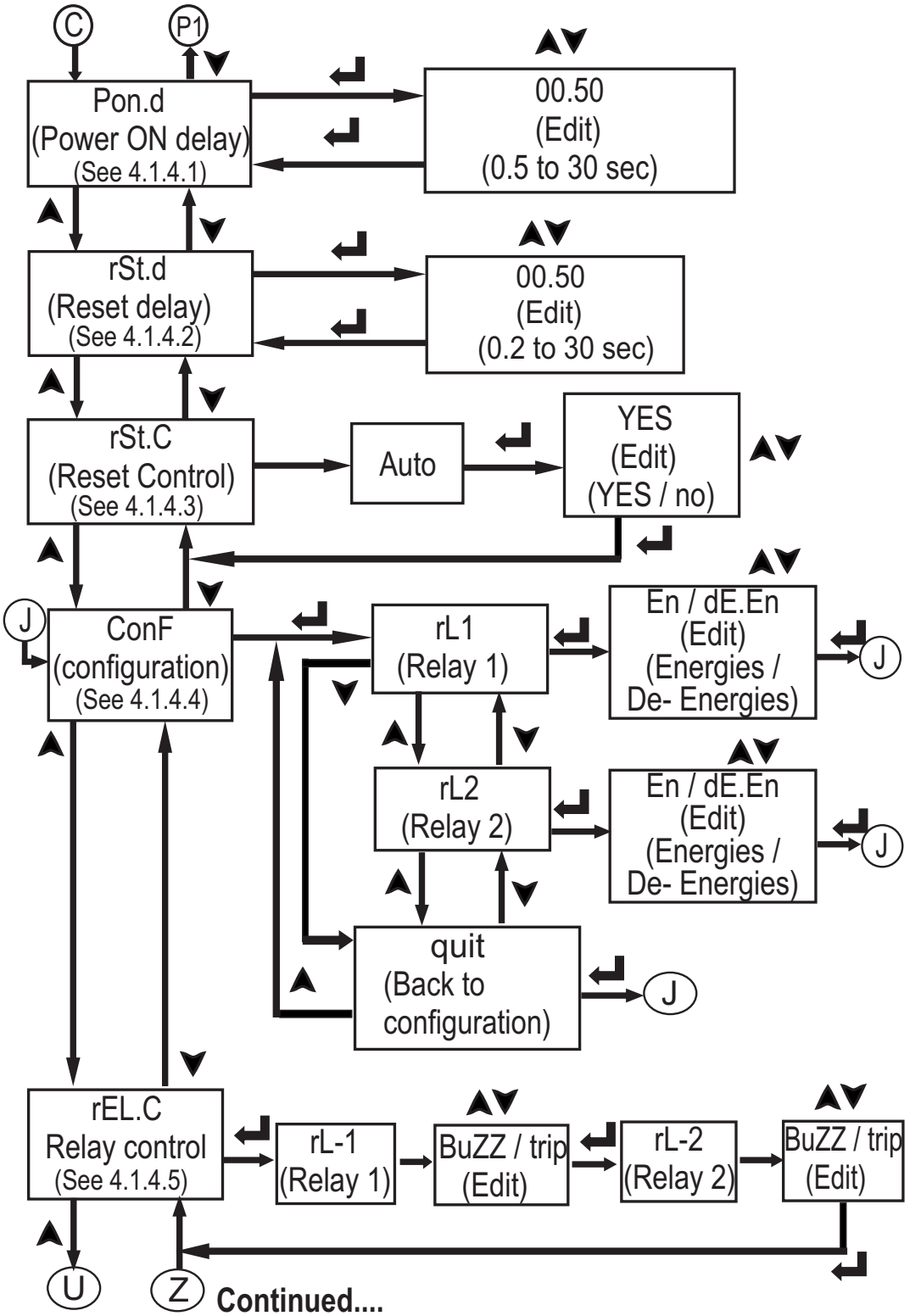
Continued....


R
S
uF (Under Frequency)
YES (Edit) (YES / no)
triP (Trip set point)
tr-d (trip delay)
HYS (Hysteresis)
no
90.0 (Edit) (90 to 99 %)
30.00 (Edit) (0 to 30.0 Sec)
15.0 (Edit) (1 to 15%)
rL1 (Edit relay output) rL1 (Relay1) /rL2 (Relay2) / rL12 (Relay 1 & Relay2) / nOnE (No relay)
Ph.F (Phase failure protection)
YES (Edit) (YES / no)
triP (Trip set point)
tr-d (trip delay)
HYS (Hysteresis)
no
70.0 (Edit) (20 to 85 %)
30.00 (Edit) (0 to 30.0 Sec)
15.0 (Edit) (1 to 15 %)
rL1 (Edit relay output) rL1 (Relay1) /rL2 (Relay2) / rL12 (Relay 1 & Relay2) / nOnE (No relay)
T
U

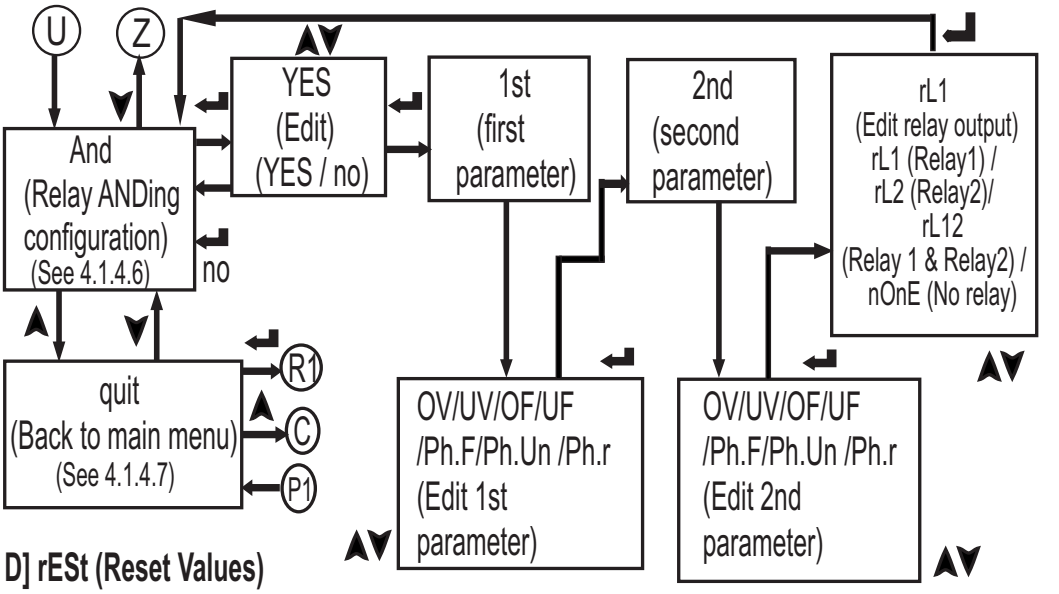
Continued....


T
U
Ph.un
(Phase
unbalance
protection)
YES
(Edit)
(YES / no)
no
triP
(Trip set
point)
20.0
(Edit)
(2 to 20%)
tr-d
(trip
delay)
30.00
(Edit)
(0 to 30.0 Sec)
HYS
(Hysteresis)
15.0
(Edit)
(1 to 15 %)
rL1
(Edit relay output)
rL1 (Relay1) /rL2 (Relay2) /
rL12 (Relay 1 & Relay2) /
nOnE (No relay)
Ph.r
(Phase
Reversal)
YES
(Edit)
(YES / no)
no
rL1
(Edit relay output)
rL1 (Relay1) /rL2 (Relay2) /
rL12 (Relay 1 & Relay2) /
nOnE (No relay)
quit
(Back to main
menu)
O1
B
w

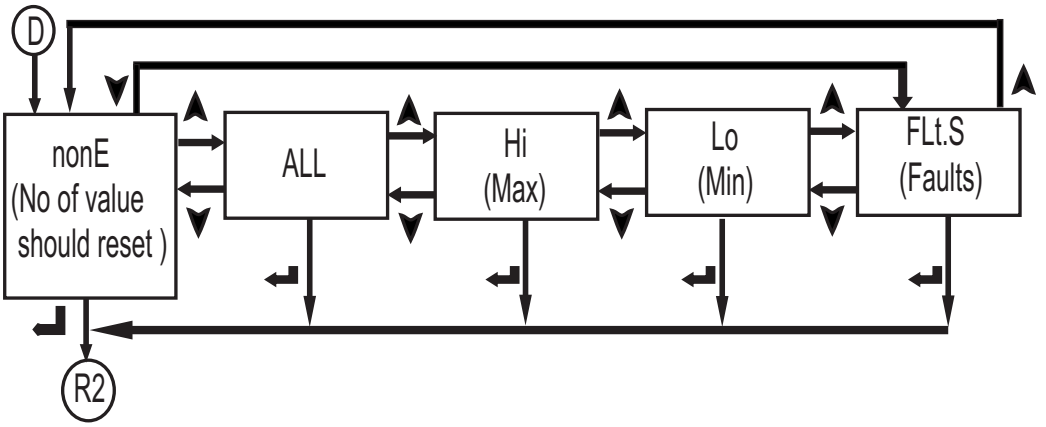
C] rELY (Relay Parameters)



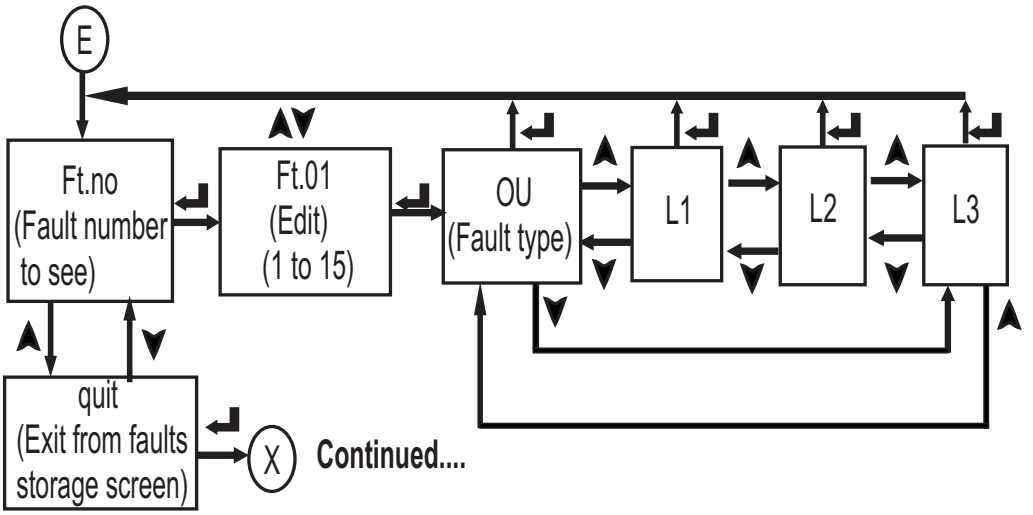
Continued....



D] rESt (Reset Values)

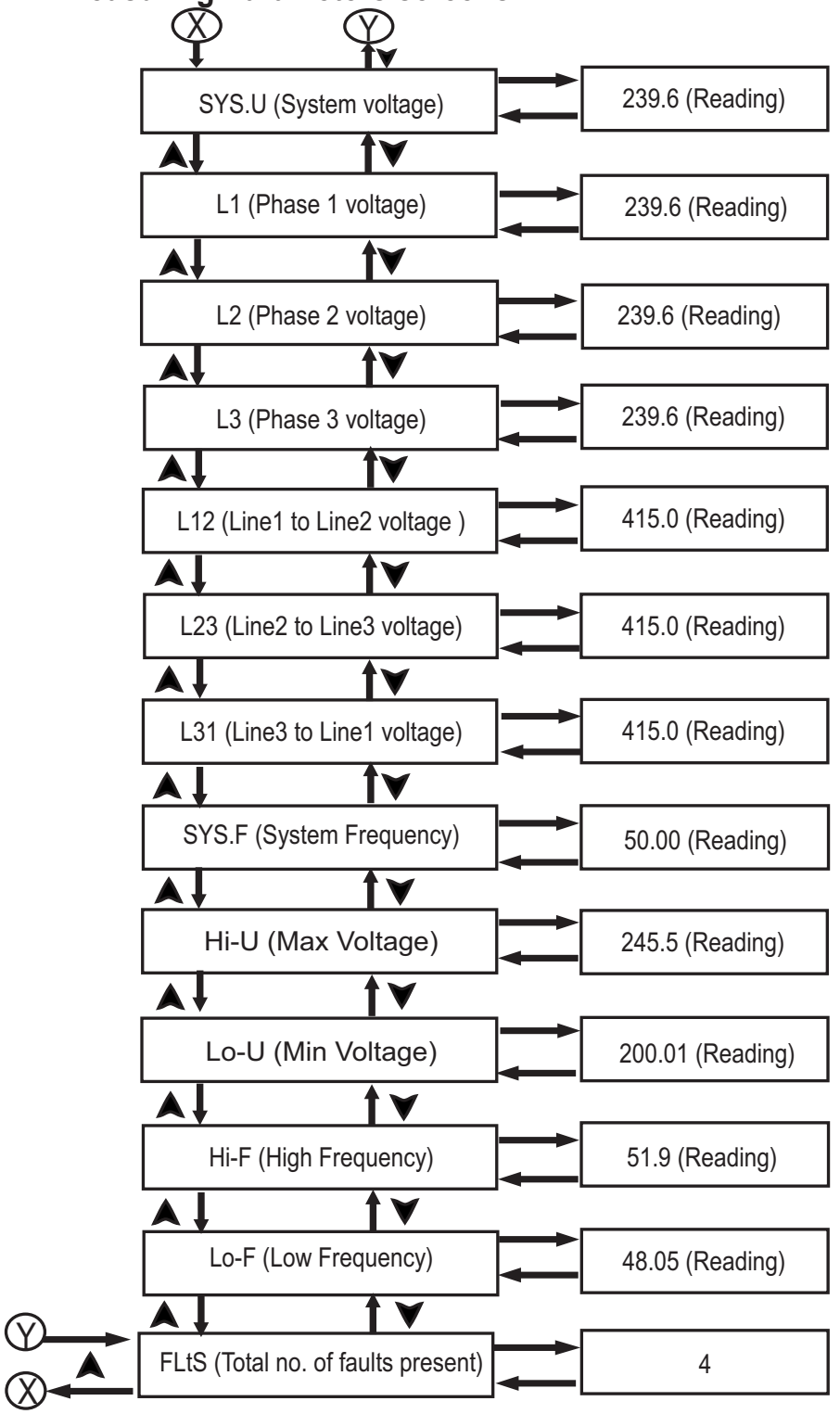


E] FALt (Faults Storage Screen)



Continued....

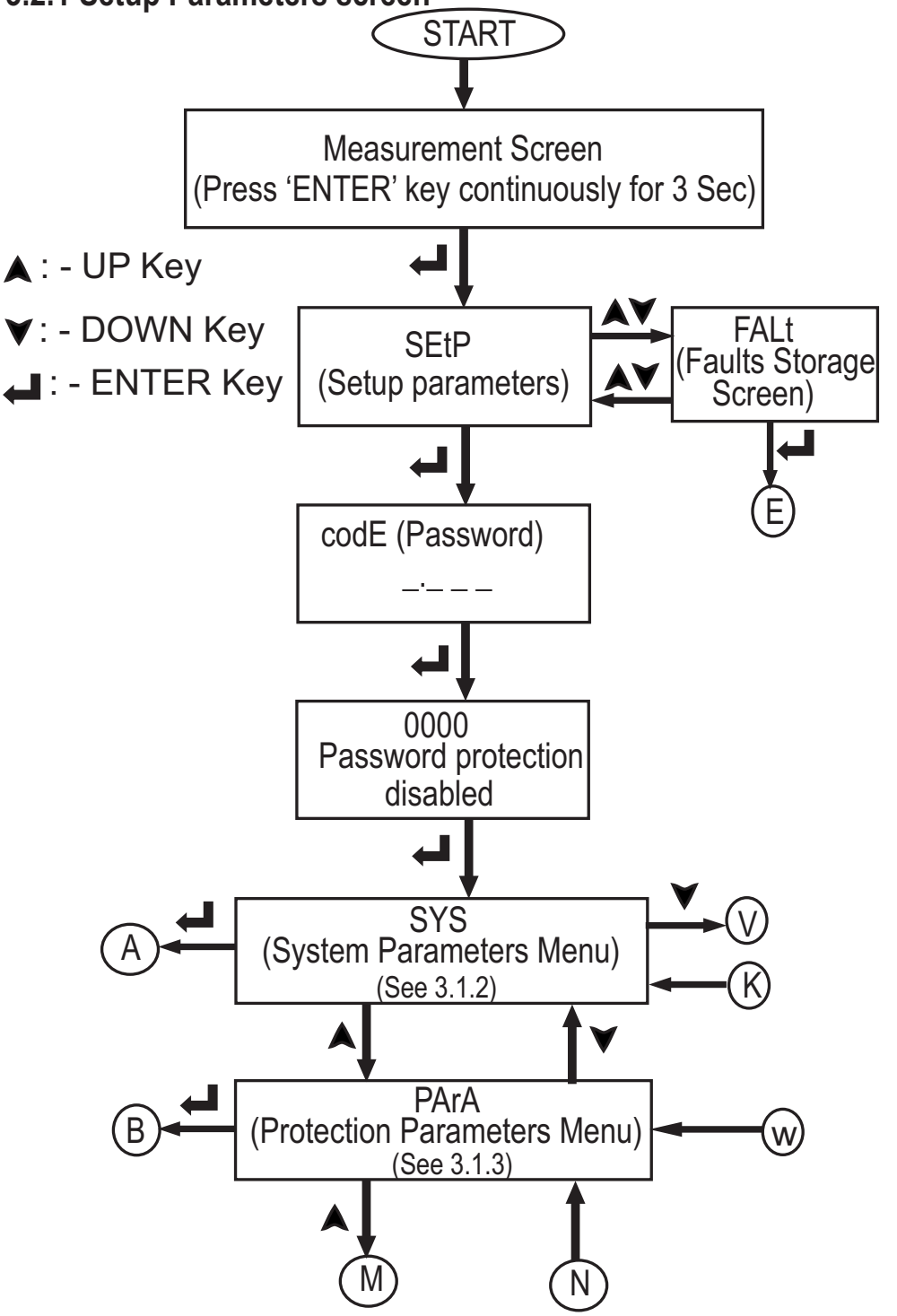
3.1.2 Measuring Parameters screens



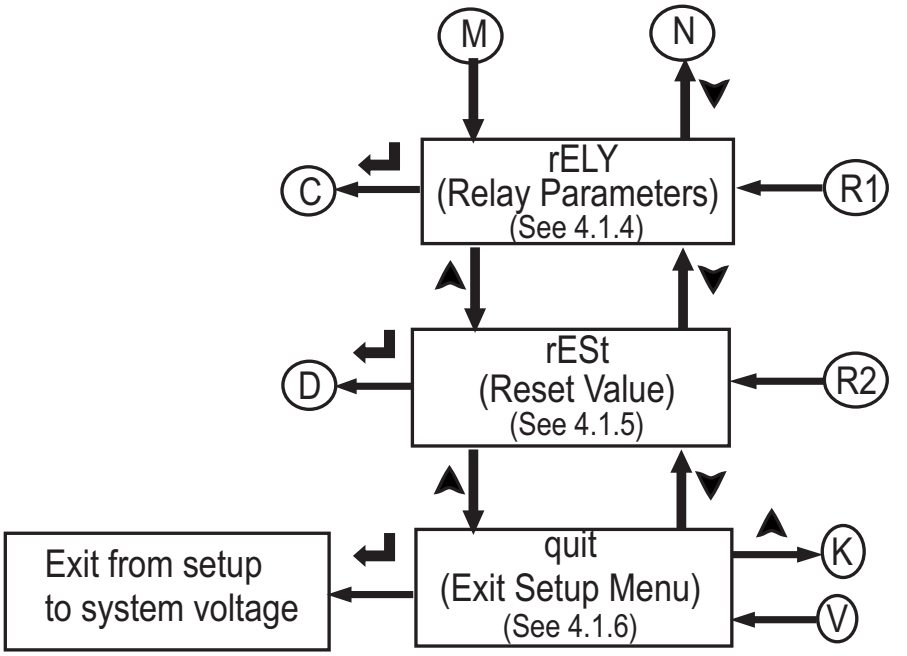
Note: - Display will toggle between Measuring parameter name and it's value.

3.2 Current Relay: -

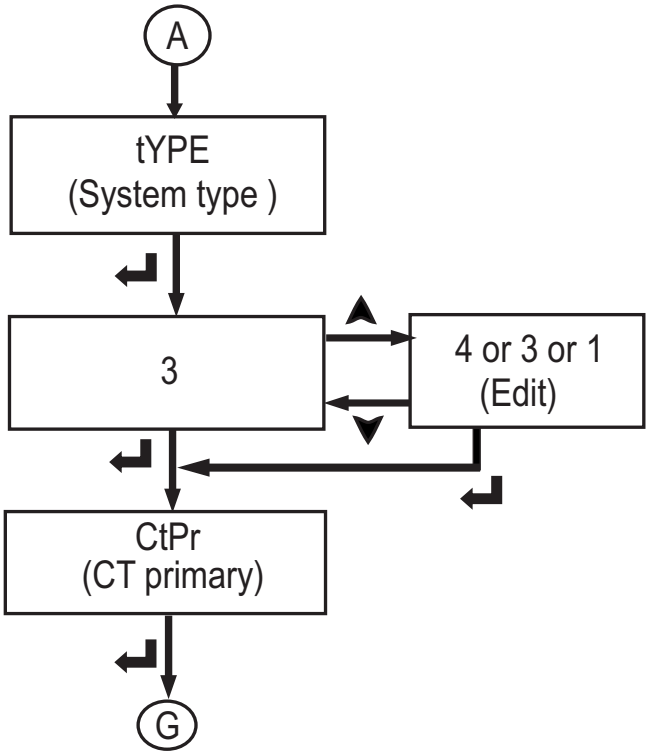
3.2.1 Setup Parameters screen



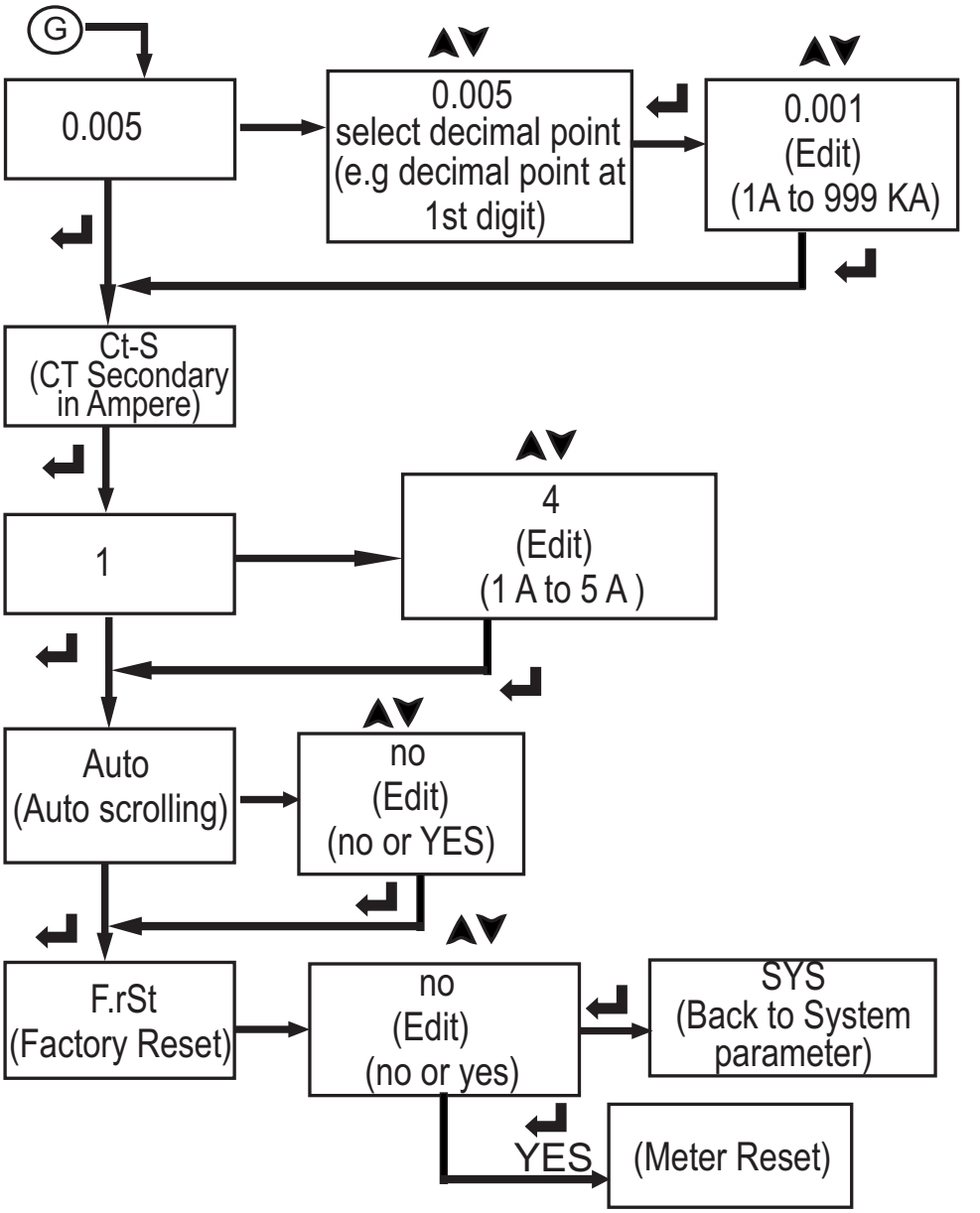
Continued....



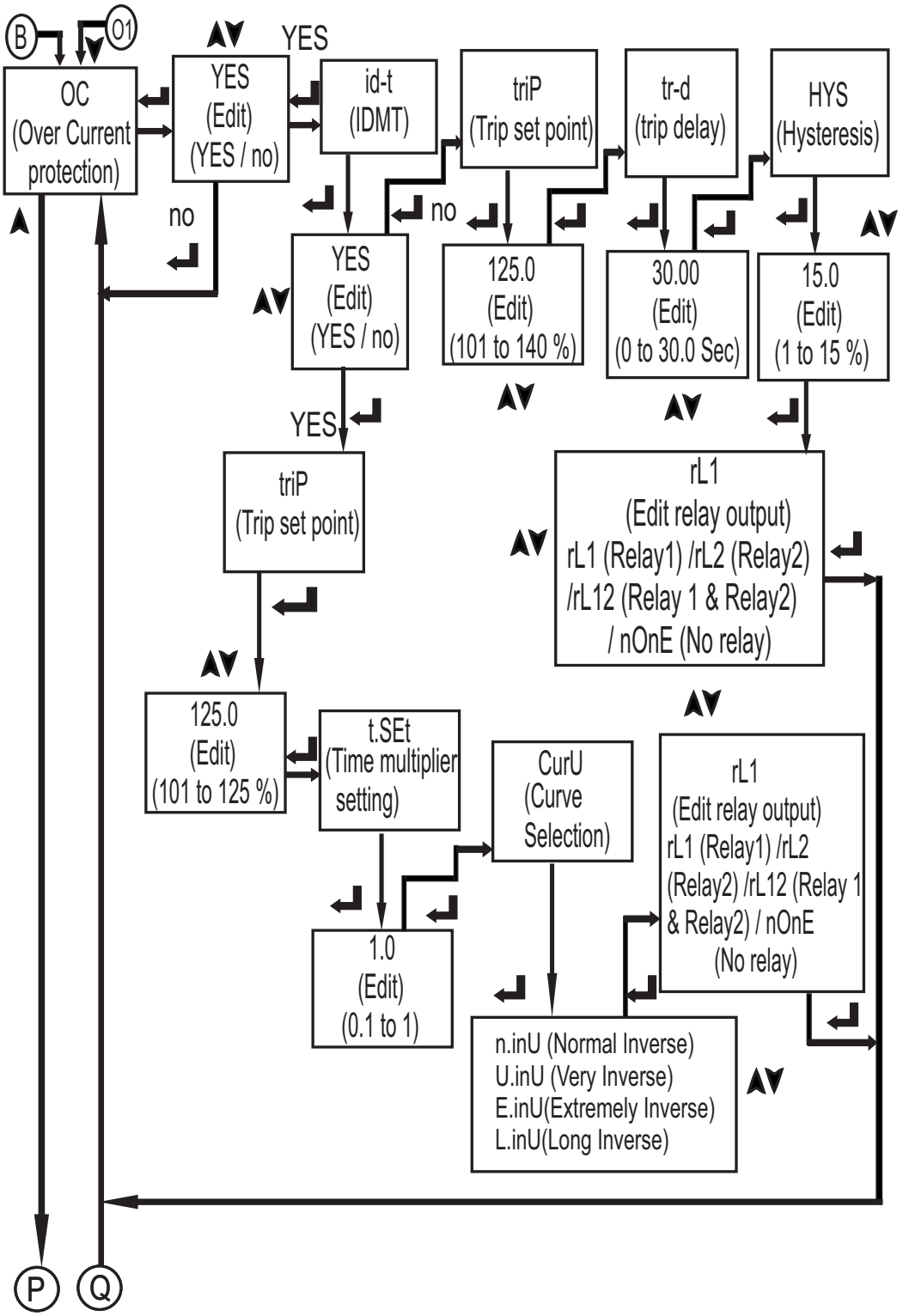
A] SYS (System Parameters Menu)

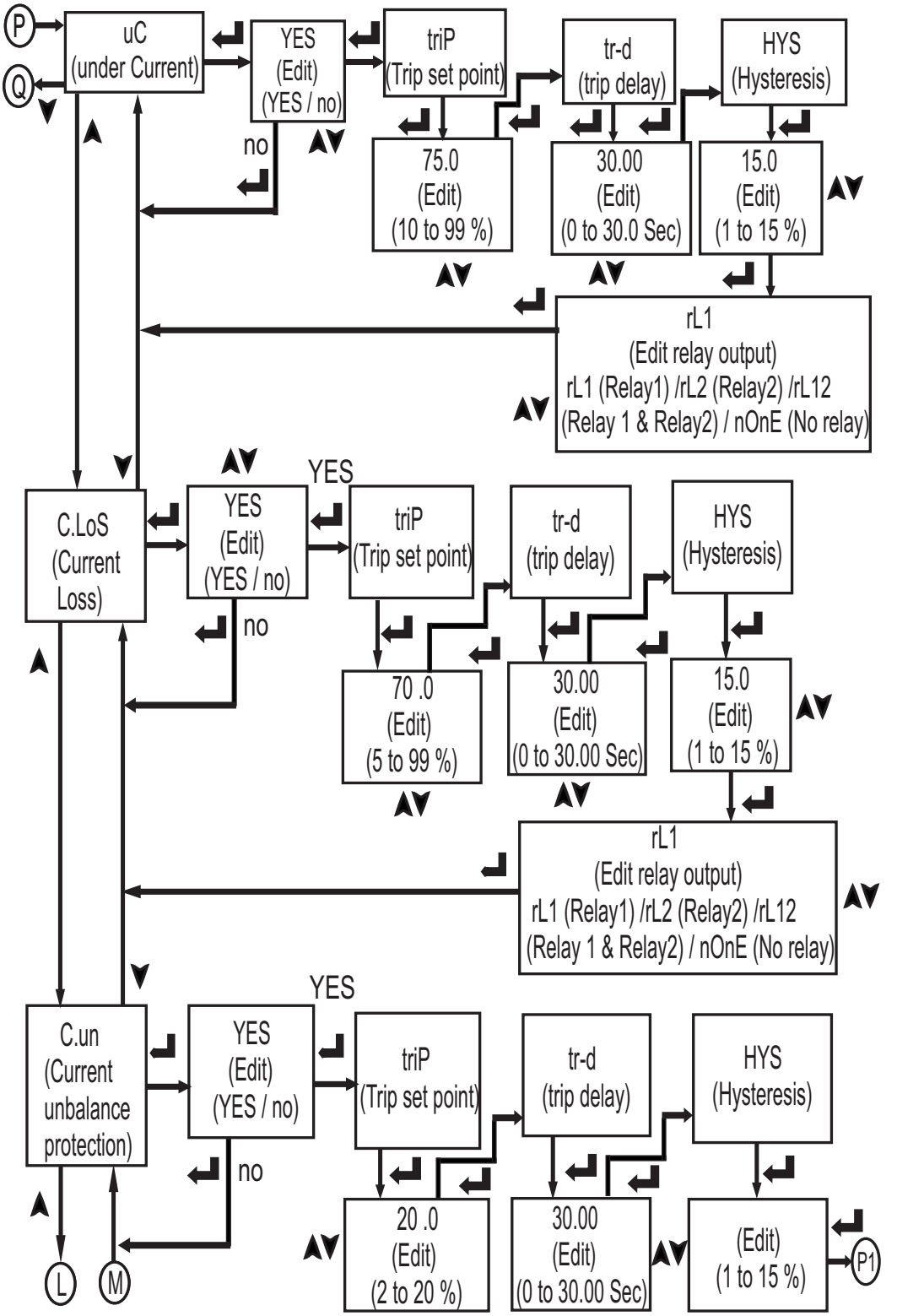


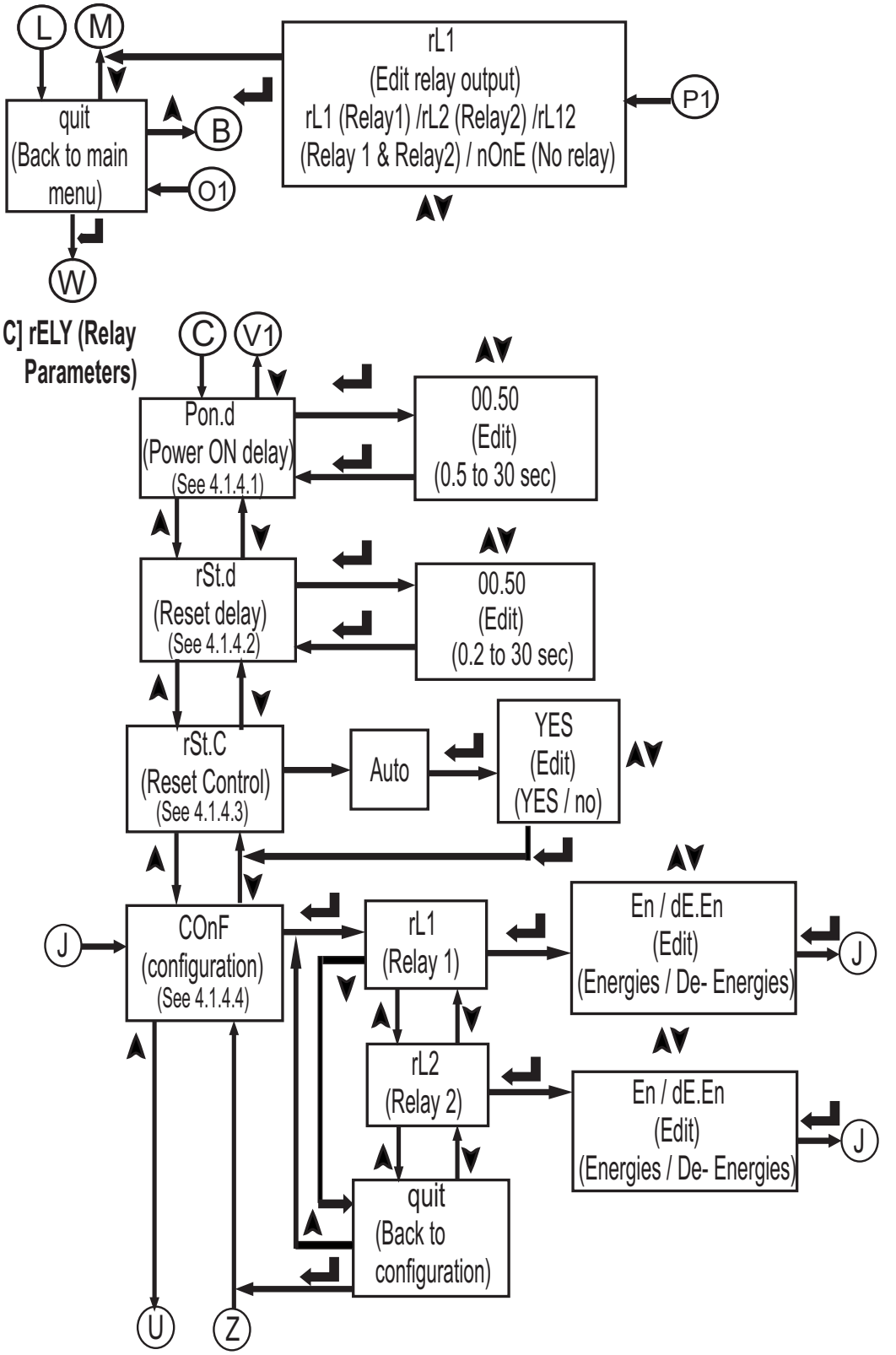
Continued....

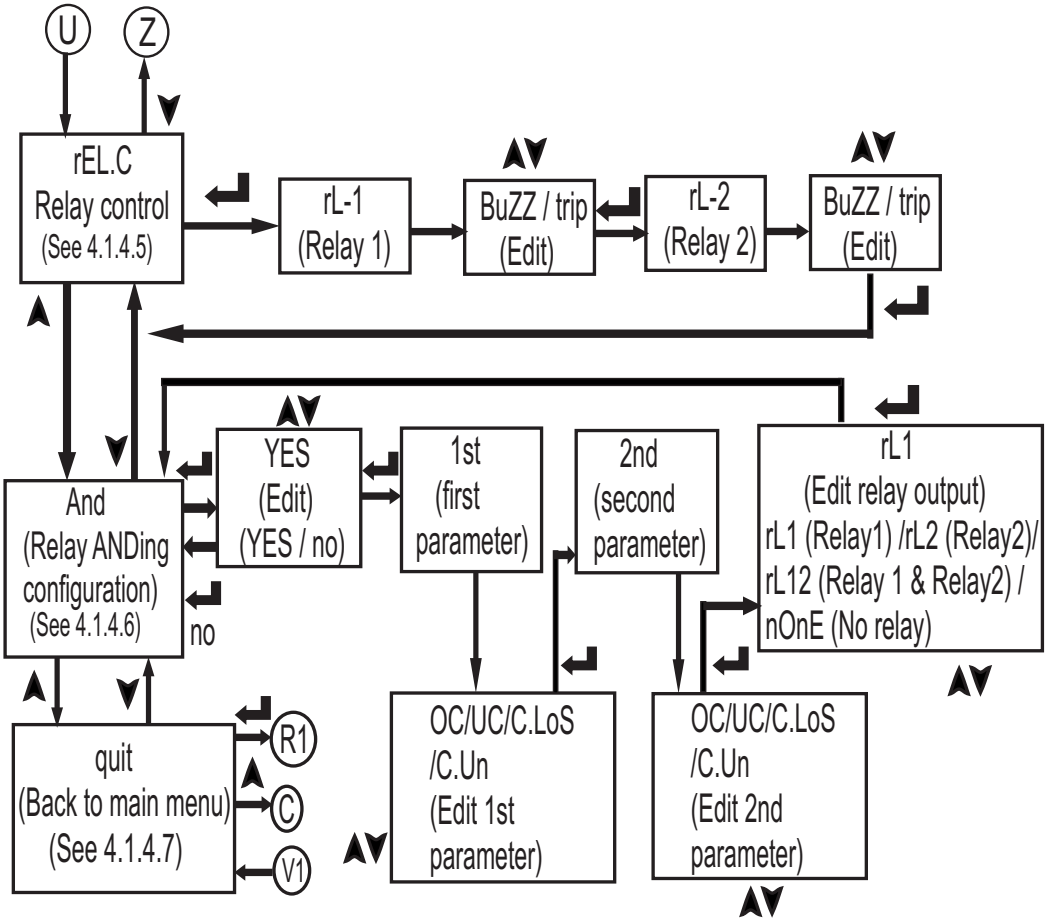

G
0.005
0.005
select decimal point
(e.g decimal point at
1st digit)
0.001
(Edit)
(1A to 999 KA)
Ct-S
(CT Secondary
in Ampere)
1
4
(Edit)
(1 A to 5 A)
Auto
(Auto scrolling)
no
(Edit)
(no or YES)
F.rSt
(Factory Reset)
no
(Edit)
(no or yes)
SYS
(Back to System
parameter)
YES
(Meter Reset)

B] PArA (Protection Parameters Menu)

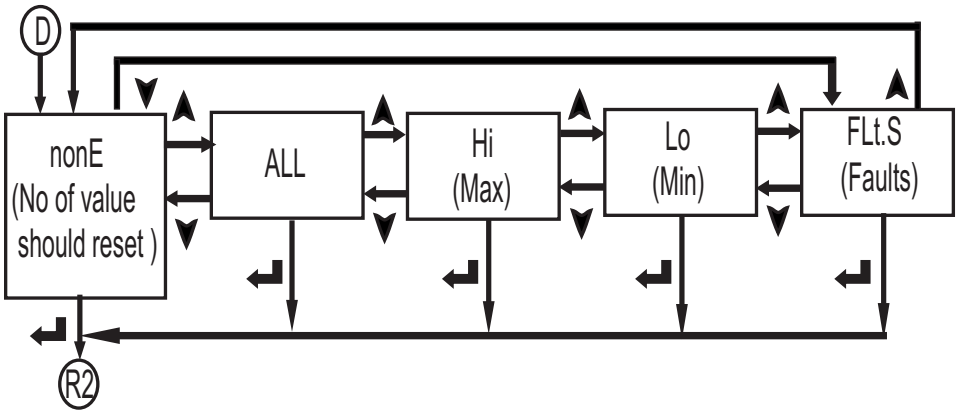



P
Q
uC
(under Current)
YES
(Edit)
(YES / no)
no
triP
(Trip set point)
75.0
(Edit)
(10 to 99 %)
tr-d
(trip delay)
30.00
(Edit)
(0 to 30.0 Sec)
HYS
(Hysteresis)
15.0
(Edit)
(1 to 15 %)
rL1
(Edit relay output)
rL1 (Relay1) /rL2 (Relay2) /rL12
(Relay 1 & Relay2) / nOnE (No relay)
C.LoS
(Current
Loss)
YES
(Edit)
(YES / no)
no
triP
(Trip set point)
70 .0
(Edit)
(5 to 99 %)
tr-d
(trip delay)
30.00
(Edit)
(0 to 30.00 Sec)
HYS
(Hysteresis)
15.0
(Edit)
(1 to 15 %)
rL1
(Edit relay output)
rL1 (Relay1) /rL2 (Relay2) /rL12
(Relay 1 & Relay2) / nOnE (No relay)
C.un
(Current
unbalance
protection)
YES
(Edit)
(YES / no)
no
triP
(Trip set point)
20 .0
(Edit)
(2 to 20 %)
tr-d
(trip delay)
30.00
(Edit)
(0 to 30.00 Sec)
HYS
(Hysteresis)
(Edit)
(1 to 15 %)
P1
L
M

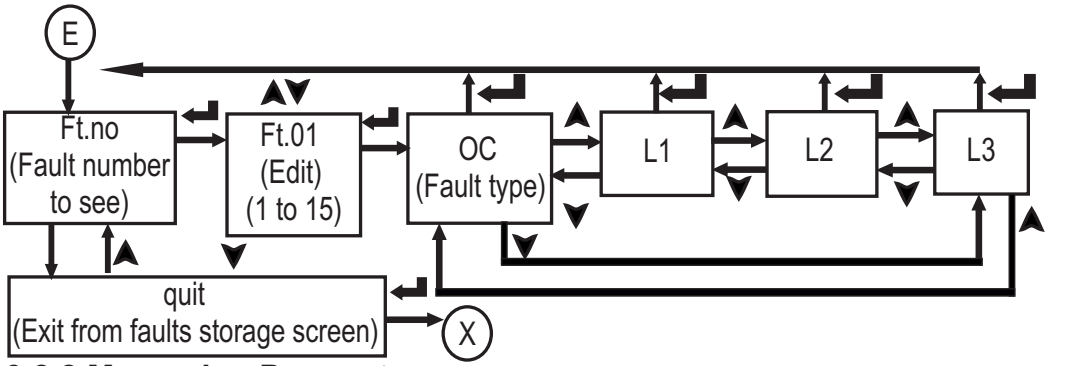

L
M
quit
(Back to main menu)
B
O1
W
rL1
(Edit relay output)
rL1 (Relay1) /rL2 (Relay2) /rL12
(Relay 1 & Relay2) / nOnE (No relay)
P1
C] rELY (Relay Parameters)
C
V1
Pon.d
(Power ON delay)
(See 4.1.4.1)
00.50
(Edit)
(0.5 to 30 sec)
rSt.d
(Reset delay)
(See 4.1.4.2)
00.50
(Edit)
(0.2 to 30 sec)
rSt.C
(Reset Control)
(See 4.1.4.3)
Auto
YES
(Edit)
(YES / no)
J
COnF
(configuration)
(See 4.1.4.4)
rL1
(Relay 1)
En / dE.En
(Edit)
(Energies / De- Energies)
J
rL2
(Relay 2)
En / dE.En
(Edit)
(Energies / De- Energies)
J
quit
(Back to configuration)
U
Z



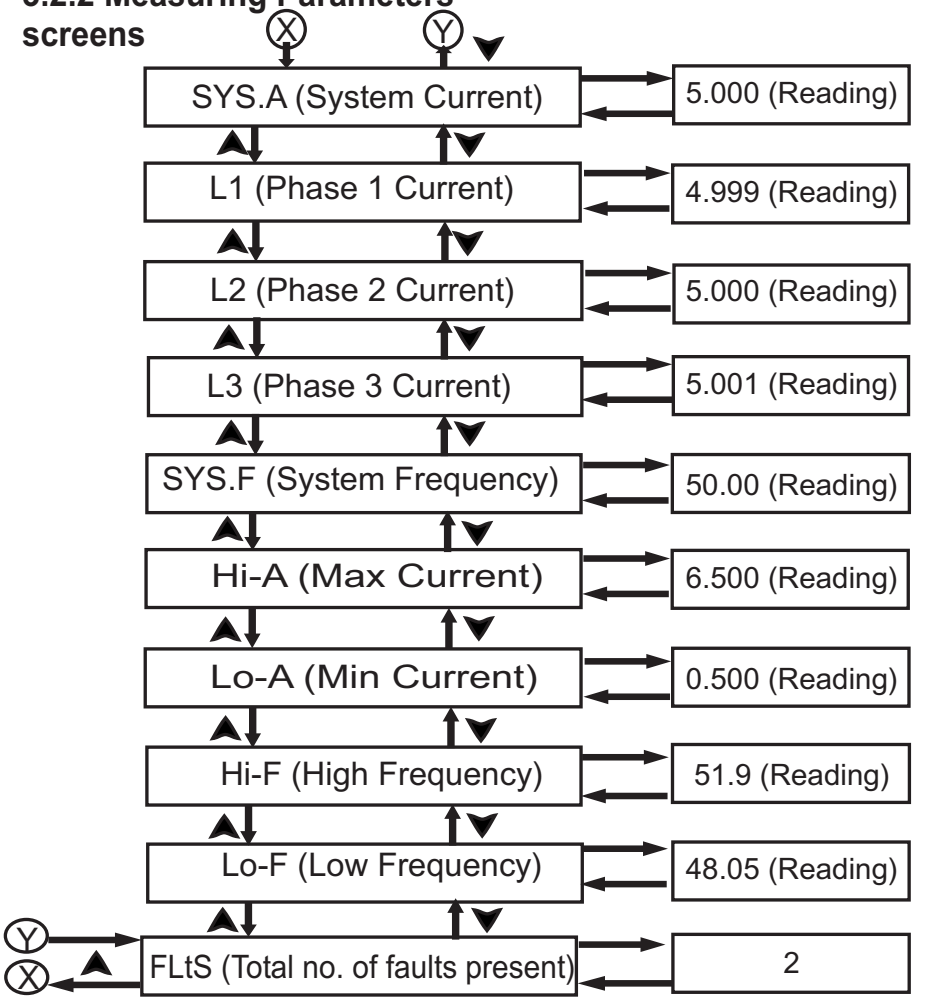
D] rESt (Reset Values)



E] FALt (Faults Storage Screen)

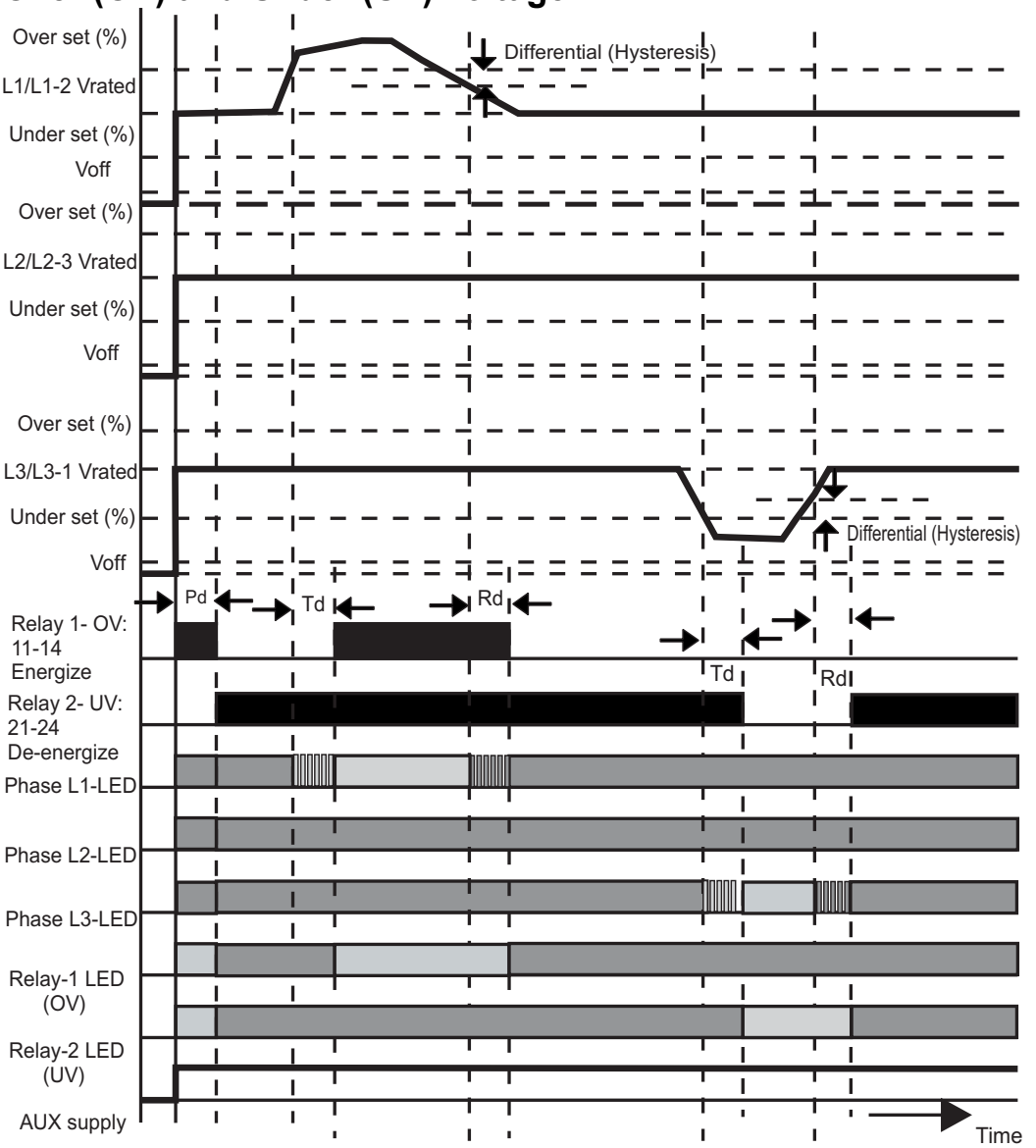


3.2.2 Measuring Parameters screens



Note: - Display will toggle between Measuring parameter name and it's value.

3.3 Timing Diagrams
Over (OV) and Under (UV) voltage



Relay States -

- Energized
- De-energized

Phase LED Indications -

- Red blinking - Trip Delay (only Phase LEDs)
- Green blinking - Reset Delay(only Phase LEDs)
- Red ON - fault condition
- Green ON - healthy condition
- Input Absent

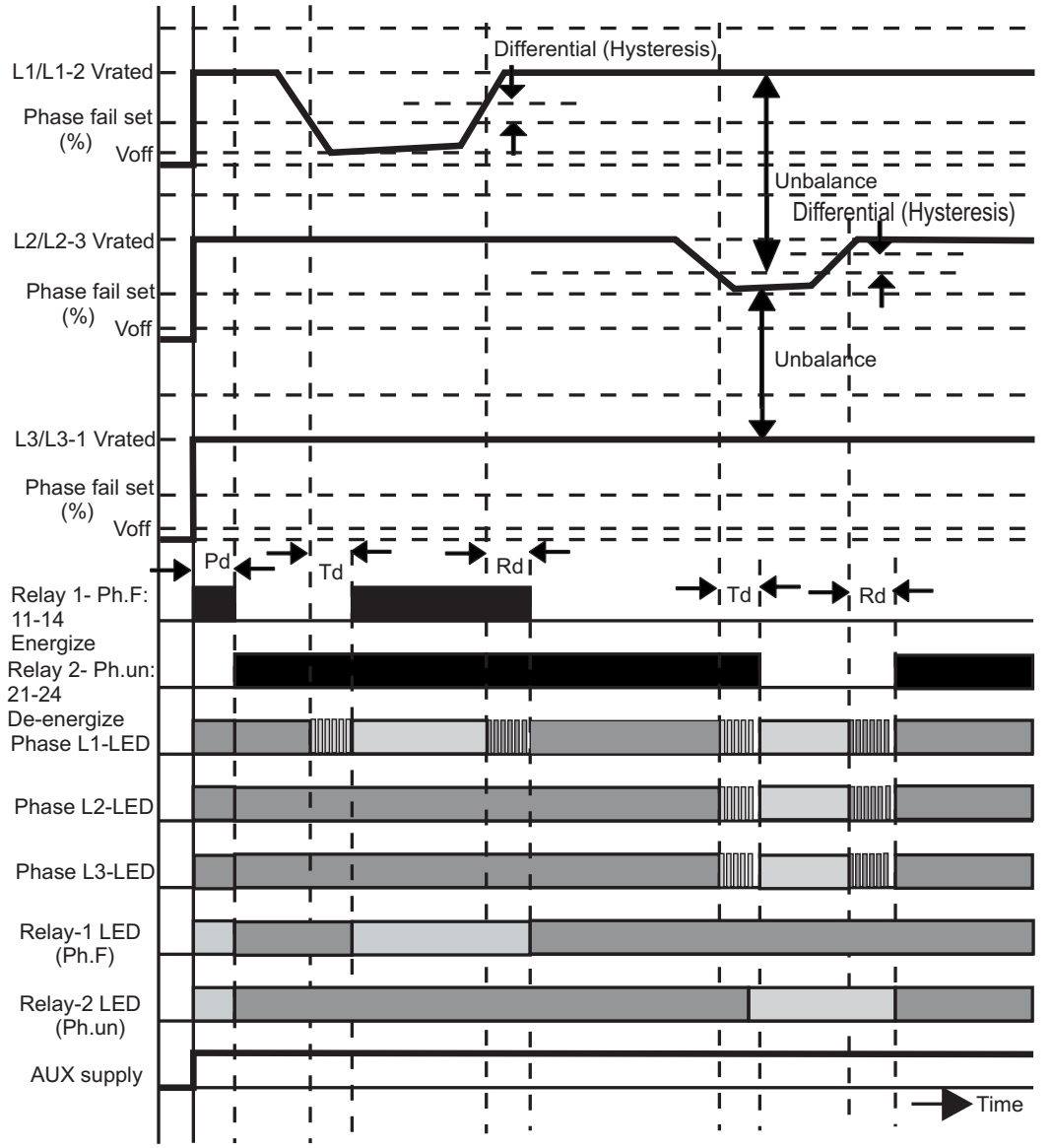
Relay LED Indications

- Red ON - fault condition
- Green ON - healthy condition

Note: 1] Pd- Power ON delay 2] Td- Trip delay 3] Rd- Reset delay 4] Both relay can be configured to energize or de-energize mode 5] Any relay can be assigned to any fault condition

Note: - For safety reasons, if relay has already tripped then it will not reset unless all phases are healthy i.e above or below hysteresis value (as the case may be). This is to prevent unrequired relay chattering.

Phase Failure (Ph.F) and Phase Unbalance (Ph.un)



Relay States -

- Energized
- De-energized

Phase LED Indications -

- Red blinking - Trip Delay (only Phase LEDs)
- Green blinking - Reset Delay(only Phase LEDs)
- Red ON - fault condition
- Green ON - healthy condition
- Input Absent

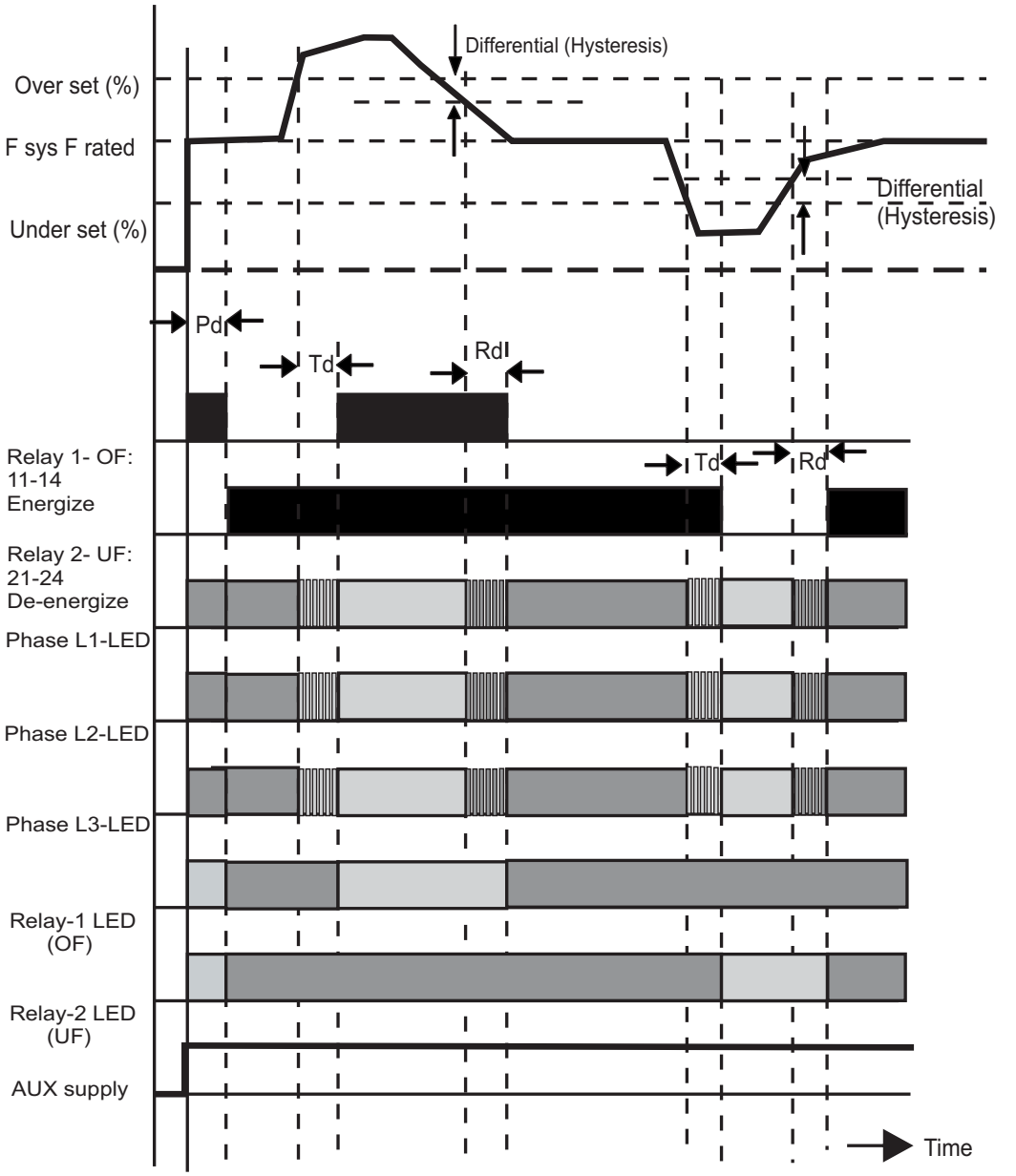
Relay LED Indications

- Red ON - fault condition
- Green ON - healthy condition

Note: 1] Pd- Power ON delay 2] Td- Trip delay 3] Rd- Reset delay 4] Both relay can be configured to energize or de-energize mode 5] Any relay can be assigned to any fault condition

Note: - For safety reasons, if relay has already tripped then it will not reset unless all phases are healthy i.e above or below hysteresis value (as the case may be). This is to prevent unrequired relay chattering.

Over (OF) and Under (UF) Frequency



Relay States -

Energized

De-energized

Phase LED Indications -

Red blinking - Trip Delay (only Phase LEDs)

Green blinking - Reset Delay(only Phase LEDs)

Red ON - fault condition

Green ON - healthy condition

Input Absent

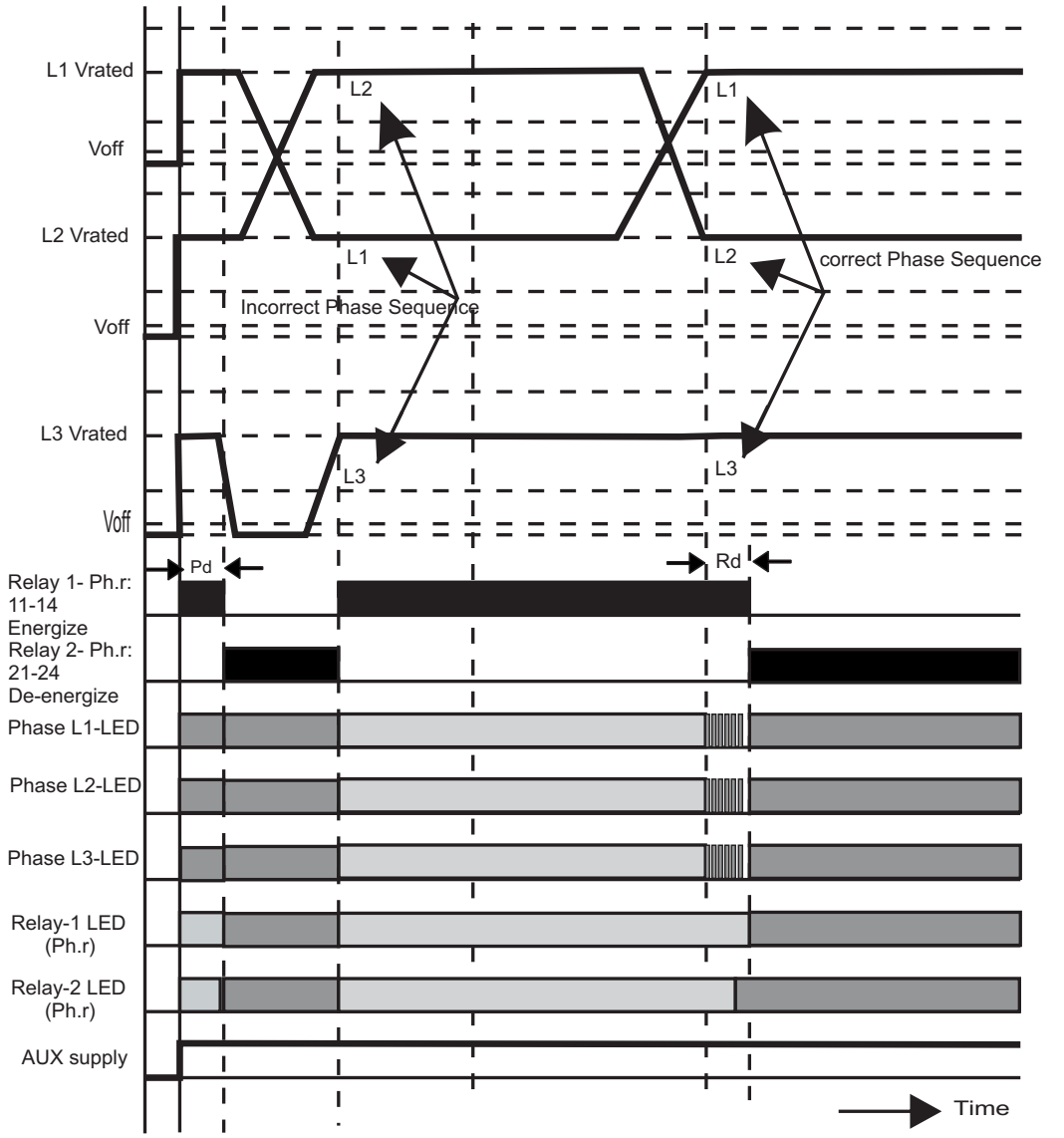
Relay LED Indications

Red ON - fault condition

Green ON - healthy condition

Note: 1] Pd- Power ON delay 2] Td- Trip delay 3] Rd- Reset delay 4] Both relay can be configured to energize or de-energize mode 5] Any relay can be assigned to any fault condition

Phase sequence (Ph.r)



Relay States -

Energized

De-energized

Phase LED Indications -

Red blinking - Trip Delay (only Phase LEDs)

Green blinking - Reset Delay(only Phase LEDs)

Red ON - fault condition

Green ON - healthy condition

Input Absent

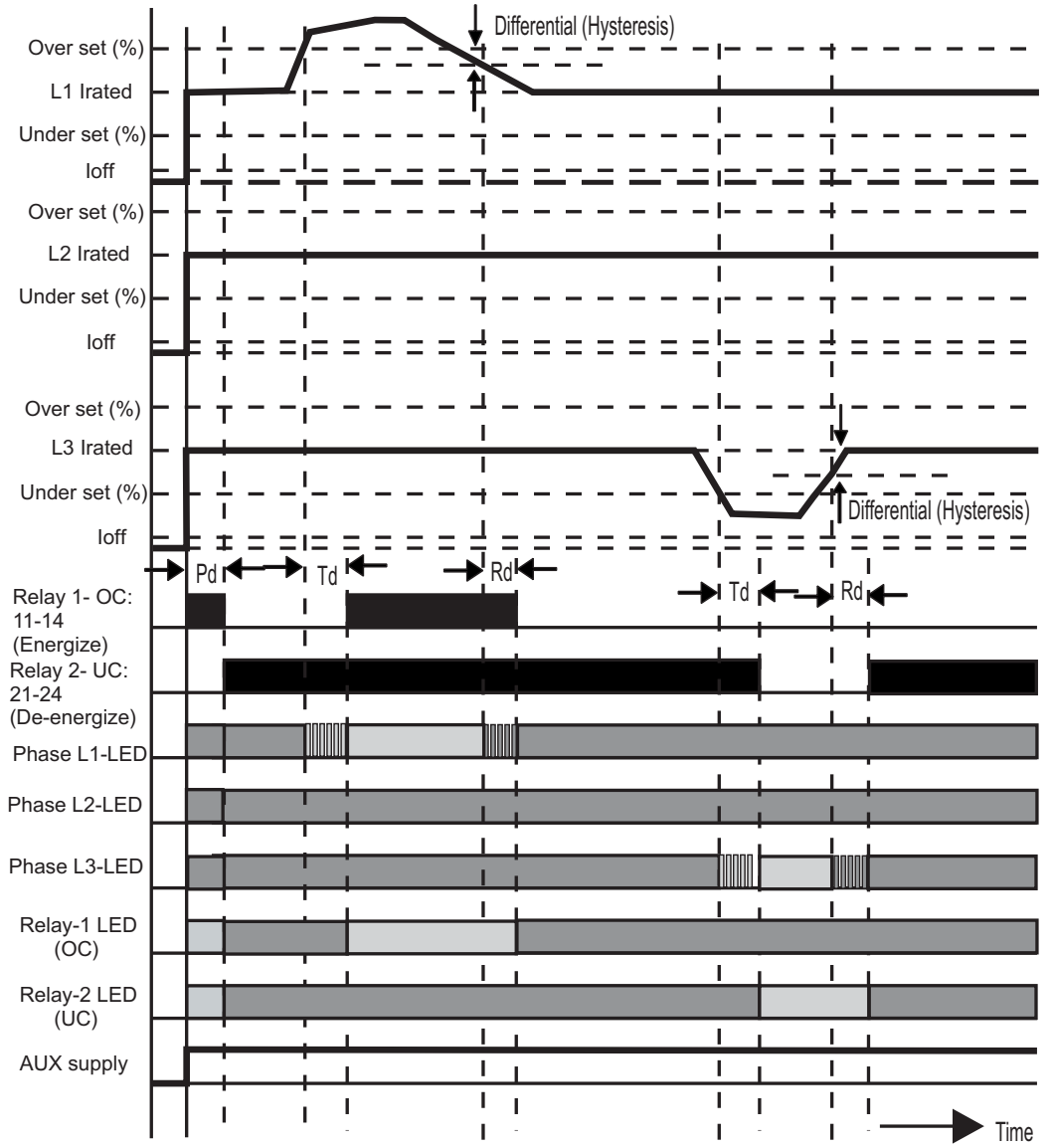
Relay LED Indications

Red ON - fault condition

Green ON - healthy condition

Note: 1] Pd- Power ON delay 2] Td- Trip delay 3] Rd- Reset delay 4] Both relay can be configured to energize or de-energize mode 5] Any relay can be assigned to any fault condition

Over (OC) and Under (UC) Current



Relay States -

- Energized
- De-energized

Phase LED Indications -

- Red blinking - Trip Delay (only Phase LEDs)
- Green blinking - Reset Delay(only Phase LEDs)
- Red ON - fault condition
- Green ON - healthy condition
- Input Absent

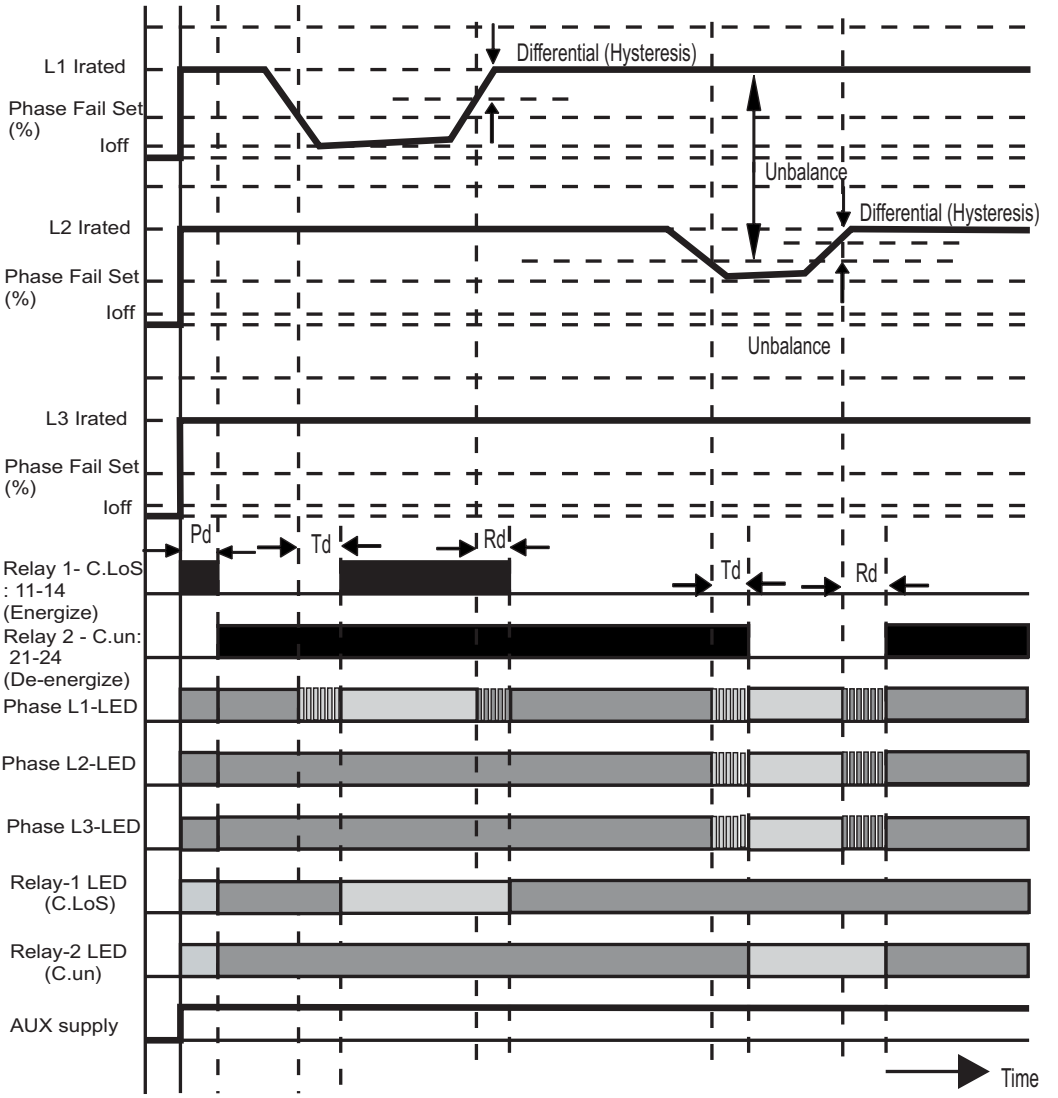
Relay LED Indications

- Red ON - fault condition
- Green ON - healthy condition

Note: 1] Pd- Power ON delay 2] Td- Trip delay 3] Rd- Reset delay 4] Both relay can be configured to energize or de-energize mode 5] Any relay can be assigned to any fault condition

Note: - For safety reasons, if relay has already tripped then it will not reset unless all phases are healthy i.e above or below hysteresis value (as the case may be). This is to prevent unrequired relay chattering.

Current Loss (C.LoS) and Current Unbalance (C.un)



Relay States -

- Energized
- De-energized

Phase LED Indications -

- Red blinking - Trip Delay (only Phase LEDs)
- Green blinking - Reset Delay(only Phase LEDs)
- Red ON - fault condition
- Green ON - healthy condition
- Input Absent

Relay LED Indications

- Red ON - fault condition
- Green ON - healthy condition

Note: 1] Pd- Power ON delay 2] Td- Trip delay 3] Rd- Reset delay 4] Both relay can be configured to energize or de-energize mode 5] Any relay can be assigned to any fault condition

Note: - For safety reasons, if relay has already tripped then it will not reset unless all phases are healthy i.e above or below hysteresis value (as the case may be). This is to prevent unrequired relay chattering.

4. PROGRAMMING

4.1 Menu Selection

The following sections comprise step by step procedures for configuring the Relay according to individual user requirement.

4.1.1 Password Protection

Fig No: - 1

To access the Set-Up menu press and hold " ENTER " key for 3 Seconds, the screen is shown in fig 1. On pressing "ENTER" key, meter will ask for password shown in fig 2.

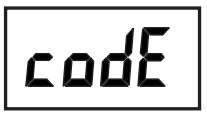


Fig No: - 2

Then meter will enter into edit mode as shown in fig 3 (*Denotes decimal Point is flashing).
Press "ENTER" key, by default password is set to "0000" as shown in fig 4.

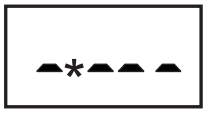


Fig No: - 3

New Password Setting

Pressing " ⮟" key decrements digit value from 9 to 0. Value will wrap from 0 to 9.

Fig No: - 4

Pressing "⮝" key increments digit value from 0 to 9, then value will wrap from 9 to 0.

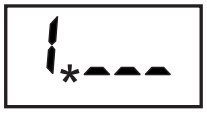


Fig No: - 5

Example: - For Setting New password "1234" follow the procedure. Press " ⮝" key or "⮟" key once, to enter into password edit mode, screen is shown in fig 3 (*Denotes decimal Point is flashing).

Fig No: - 6

Press " ⮝" key to increment first digit to ' 1 ' as shown in fig 5. Press " ENTER " key to confirm number 1, decimal point will shift to next digit. Press " ⮝" key to increment second digit to ' 2 ' as shown in fig 6. Press " ENTER " key to confirm digit 2.

Fig No: - 7

Press "⮝" key to increment third digit to " 3" as shown in fig 7.

Press " ENTER " key to confirm digit " 3 ".

Fig No: - 8

Press " ⮝" key to increment fourth digit to " 4 " as shown in fig 8.

Press " ENTER " key to confirm digit " 4 ".

Fig No: - 9

On pressing " ENTER " key new password will be set as shown in fig 9. On again pressing "ENTER" key meter will confirm new password & will go to SET UP menu.

For changing password at screen shown in fig 9, Press "▲" key or "▼" key and start from "**New Password Setting**".

SETUP Menu

Press "▲" key or "▼" key to move through set up menu.

Fig No: - 10

"SYS" (System) menu allows user to select different system parameters like "System Type", "PT / CT primary", "PT / CT Secondary", "System Frequency", "Phase Sequence", "Auto", "Factory Reset". (Refer Section 4.1.2.1 to 4.1.2.9)

Fig No: - 11

"PArA" (Parameter) menu allows user to select different fault parameters like "OV" (Over Voltage), "UV" (Under Voltage), "OF" (Over Frequency), "UF" (Under Frequency), "Ph.un" (Phase Unbalance), "Ph.F" (Phase Failure), "Ph.r" (Phase Reversal) for **Line Monitoring Relay / Voltage Protection Relay** (Refer Section 4.1.3)

OR

Fig No: - 12

"OC" (Over Current),"UC" (Under Current),"C.LoS" (Current Loss), "C.un" (Current Unbalance) for **Current Protection Relay**. (Refer Section 4.1.3)

"rELY" (Relay) menu allows user to select different Relay related parameters like "Pon.d" (Power ON delay), "rSt.d" (Reset delay), "rSt.C" (Reset Control), "COnF" (Relay Configuration), "rEL.C" (Relay Control), "And" (AND). (Refer section 4.1.4)

Fig No: - 13

"rESt" (Reset) menu allows user to reset different parameters like "ALL" (all Voltage / Current , Frequency), "Hi" (High Voltage / Current , Frequency), "Lo" (Low Voltage / Current , Frequency), "FLt.S" (Faults). (Refer section 4.1.5)

Fig No: - 14

"quit" (Quit) menu allows user to quit from SETUP menu. (Refer section 4.1.6)

4.1.2 System Parameter Selection Menu

Fig No: - 15

4.1.2.1 System Type

"SYS" (System) menu allows user to set system parameters.

Fig No: - 16

On pressing "ENTER" key meter will enter into system parameters & ask for system type selection as shown in fig 16. This screen is used to set the system type (only for 3 phase meter), 3 for 3P3W, 4 for 3P4W & 1 for 1P2W.

Fig No: - 17

Now the screen will show previously stored system type "4" as shown in fig: - 17.

Setting New system Type: -

Fig No: - 18

Pressing "▲" or "▼" key, meter will enter into edit mode. Pressing " ▲" key increments digit value & Pressing " ▼" key decrements digit value.

Example: - For Setting new system type "3" follow the procedure: - Press "▲" key or "▼" key to get number "3 " as shown in fig 18.

Fig No: - 19

On pressing " ENTER " key new system type will be set as shown in fig 19. On again pressing "ENTER" key meter will confirm new system type & will go to PT primary setting (for **Voltage Relay**) (refer Section 4.1.2.2) or to CT primary setting for (**Current Relay**) (refer Section 4.1.2.4)

Fig No: -20

Voltage Relay: -

4.1.2.2 Potential Transformer (PT) Primary V-Line to Line

Fig No: -21

This Screen allows user to set Potential Transformer's primary value in KV. K is indicated by annunciation of 'K' LED.

The PT primary can be set from 0.100 $K_{V_{L-L}}$ to 1200 KV_{L-L}.

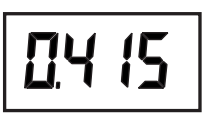


Fig No: -22

" PtPr " (Potential transformer primary) is shown in fig 20 & "VLL" (Line to Line Voltage) is shown in fig 21. After VLL, meter will show previously stored PtPr value " 0.415 " (415 V_{L-L}) as shown in fig 22 and " K " LED will be lit which indicate in KV .

Fig No: -23

Fig No: -24

Fig No: -25

Fig No: -26

Fig No: -27

Fig No: -28

Fig No: -29

Fig No: -30

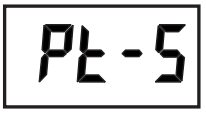


Fig No: -31

Fig No: -32

Setting New Potential transformer's Primary Value.

Pressing "▲" or "▼" key, meter will enter into edit mode Pressing "▲" key increments digit value & Pressing "▼" key decrements digit value.

Example: - For setting new PtPr value to 0.230KV, follow the steps:

pressing " ▲" key or " ▼" key first time, meter will edit position of decimal point.

As shown in fig 22 decimal point is adjusted.

Pressing "ENTER" key will start blinking decimal point & editing of value as shown in fig 23.

Press "ENTER" key to advance to next digit as shown in fig No 24. (*Denotes decimal Point is flashing).

Press "▼" key to decrement digit to "2" as shown in fig 25.

Press "ENTER" key to advance to next digit as shown in fig 26.

Now press "▲" key to increment digit to "3", as shown in fig 27. Press "ENTER" key to advance to next digit as shown in fig 28.

Press "▼" key to decrement digit to " 0 " as shown in fig 29. On pressing " ENTER " key new PT primary will be set as shown in fig 30. On again pressing "ENTER" key, meter will confirm new PT primary & will go to Potential Transformer's Secondary setting refer section 4.1.2.3

4.1.2.3 Potential Transformer (PT) Secondary V-Line to Line

This screen allows user to set potential transformer's secondary value in V. The PT secondary can be set from 100 V_{L-L} to 600 V_{L-L}.

" Pt-S " (Potential transformer's secondary) is shown in fig 31 "VLL" (Line to Line Voltage) is shown in fig 32. After VLL meter will show previously stored PT secondary value. (*Denotes decimal Point is flashing).

Setting New Potential transformer's Secondary Value:
Pressing "▲" or "▼" key, meter will enter into edit mode. Pressing "▲" key increments digit value & Pressing "▼" key decrements digit value. Pressing "ENTER" key will advance to next digit. After setting Pt-S value meter will go to System Frequency setting menu. (Refer Section 4.1.2.6)

Fig No: -33

Current Relay: -

4.1.2.4 Current Transformer (CT) Primary

This Screen "CtPr " (Current Transformer Primary) allows user to set Current transformer's primary value in KA.
Kilo is indicated by annunciation of K LED. CT primary can be set from 1A to 999 KA.
After CtPr meter will show previously stored CT Primary value.

Setting New Current transformer's Primary Value:
Pressing "▲" or "▼" key, meter will enter into edit mode.
Pressing "▲" or "▼" key first time, meter will edit position of decimal point.
Pressing "ENTER" key will start decimal point blinking.
Pressing "▲" key increments digit value & Pressing "▼" key decrements digit value.
Pressing "ENTER" key will advance to next digit.
After setting Ct-Pr value meter will go to Current transformer's secondary setting refer section 4.1.2.5

4.1.2.5 Current Transformer (CT) Secondary

Fig No: -34

This Screen " Ct-S " (Current transformer Secondary) allows user to set Current transformer's Secondary value in A.
The CT secondary can be set from 1A to 5A. After "Ct-S" as shown in fig 34, meter will show previously stored CT Secondary value.

Setting New Current transformer's Secondary Value.

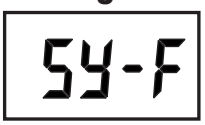


Fig No: -35

Pressing "▲" or "▼" key, meter will enter into edit mode. Pressing "▲" key increments digit value & Pressing "▼" key decrements digit value.
Pressing "ENTER" key will set new CT secondary. On again pressing "ENTER" key meter will confirm new CT secondary.

After setting Ct-S value meter will go to the Auto scrolling mode refer section 4.1.2.8

4.1.2.6 System Frequency (Voltage Relay only)

This Screen " SY-F " (System frequency) allows user to set System frequency value as 50 or 60 Hz.

After "SY-F" Screen will show previously stored system frequency value.

Setting New System frequency Value.

Pressing "▲" or "▼" key, meter will enter into edit mode.

Again Pressing "▲" or "▼ " key meter will show 50 Hz or 60 Hz.

Pressing "ENTER" key meter will set new System frequency. On again pressing "ENTER" key meter will confirm new system frequency. After setting "SY-F" value meter will go to Phase sequence setting (refer section 4.1.2.7).

4.1.2.7 System Phase Sequence (Voltage Relay only)

Fig No: -36

This Screen " Ph.Sq " (Phase sequence) allows user to set system phase sequence as 123 or 321.

After "Ph.Sq" meter will show previously stored Phase sequence.

Setting New Phase sequence:

Pressing "▲" or "▼" key, meter will enter into edit mode.

Again Pressing "▲" or "▼" key meter will show "123" OR "321".

Pressing "ENTER" key meter will set new Phase Sequence. On again pressing "ENTER" key meter will confirm new Phase Sequence.

After setting "Ph.Sq" meter will go to Auto scrolling mode (refer section 4.1.2.8).

4.1.2.8 Auto Scroll

Fig No: -37

This Screen " Auto" allows user to enable screen scrolling.

After "Auto" meter will show previously stored auto scrolling mode. (YES \ NO)

Setting Auto scrolling mode:

Pressing"▲" or " ▼" key, meter will enter into edit mode. Press " ▲" or"▼" key to get "YES".

On pressing " ENTER " key Auto scrolling mode will be set. On again pressing "ENTER" key meter will confirm newly changed auto scrolling mode & go to Factory reset (refer section 4.1.2.9)

Note: - If faults are present auto scrolling mode will not work.

4.1.2.9 Factory Reset

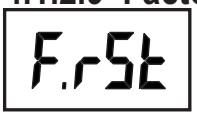


Fig No: -38

This Screen " F.rst " (Factory Reset) allows user to reset meter to factory default setting.

Factory Resetting :-

To Reset meter to factory default setting follow the procedure: -

Pressing "▲" or "▼" key, meter will enter into edit mode.

Example: -

Press "▲" key to get "YES". On pressing " ENTER " key Meter will be reset to default setting (Refer section 6 for **Default settings)**.

4.1.3 Parameter Selection Menu

4.1.3.1 Parameters selection

"PArA " (Parameters selection) allows user to select 7 different parameters For (**Line Monitoring Relay**) & 4 different parameters For (**Voltage Protection Relay**, **Current Protection Relay**) .

Press "ENTER" key to enter into parameters selection screen.

Press "▲" key or "▼" key to move through parameter selection menu.

By pressing "ENTER" key User can select the desired parameters (refer section 4.1.3.2).

The available parameters are "OV" (Over Voltage) , "UV" (Under Voltage), "OF" (Over Frequency), "UF" (Under Frequency), "Ph.un" (Phase Unbalance), "Ph.F" (Phase Failure), "Ph.r" (Phase Reversal) for **Voltage Relay** and "OC" (Over Current), "UC" (Under Current), "C.LoS" (Current Loss), "C.un" (Current Unbalance) for **Current Relay**.

Fig No: -39

4.1.3.2 YES / NO

This screen is used to activate OR Deactivate a parameter.

By default all parameters are disabled as shown in fig 39

Fig No: - 40

Parameters Enable mode :-

To enabled parameters follow the steps: -

Pressing " ▲" or " ▼" key, meter will enter into edit mode.

Example: -

Fig No: -41

Press "▲" key to get "YES" on screen as shown in fig 40. On pressing " ENTER " key Selected parameters will be enabled as shown in fig 41.

On again pressing "ENTER" key enabled parameters will be confirm & go to ("trip" Trip point refer section 4.1.3.3 or "IDMT" for "OC" (Over Current parameter) refer section 4.1.3.8

Note: - Phase Failure is enabled by default. It can not be disabled.

4.1.3.3 Trip Point

Pressing "▲" or "▼" key, meter will enter into edit mode. Pressing "▲" key increments digit value & Pressing"▼" key decrements digit value. Pressing "ENTER" key will confirm new trip point. After setting new trip point if IDMT (for Current Relay) is enabled meter will goto TMS setting refer section 4.1.3.9.1 & if IDMT is disabled meter will go to Trip delay (refer section 4.1.3.4)

TABLE 2 (A): Voltage Relay

Parameters	Upper Limit	Lower limit
OV (Over Voltage)	125%	101%
UV (Under Voltage)	99%	70%
OF (Over Frequency)	110%	101%
UF (Under Frequency)	99%	90%
Ph.F (Phase Fail)	85%	20%
Ph.un (Phase Unbalance)	20%	2%

TABLE 2 (B): Current Relay

Parameters	Upper Limit	Lower limit
OC (Over Current)	140%	101%
UC (Under Current)	99%	10%
C.LoS (Current Loss)	99%	5%
C.un (Current Unbalance)	20%	2%

Note: Upper limit for IDMT is 125%.

4.1.3.4 Trip Delay

Pressing "▲" or "▼" key, meter will enter into edit mode. Pressing "▲" key increments digit value & Pressing"▼" key decrements digit value. Pressing "ENTER" key will confirm new trip Delay.

After setting new trip Delay meter will goto Hysteresis (refer section 4.1.3.5)

TABLE 3 (A): Voltage Relay

Parameters	Upper Limit	Lower limit
OV (Over Voltage)	30 sec	0 sec
UV (Under Voltage)	30 sec	0 sec
OF (Over Frequency)	30 sec	0 sec
UF (Under Frequency)	30 sec	0 sec
Ph.F (Phase Fail)	30 sec	0 sec
Ph.un (Phase Unbalance)	30 sec	0 sec

TABLE 3 (B): Current Relay

Parameters	Upper Limit	Lower limit
OC (Over Current)	30 sec	0 sec
UC (Under Current)	30 sec	0 sec
C.LoS (Current Loss)	30 sec	0 sec
C.un (Current Unbalance)	30 sec	0 sec

4.1.3.5 Hysteresis

Pressing "▲" or "▼" key, meter will enter into edit mode. Pressing "▲" key increments digit value & Pressing "▼" key decrements digit value. Pressing "ENTER" key will confirm new hysteresis.

After setting new Hysteresis meter will goto Relay assignment (refer section 4.1.3.6)

If "Ph.un" (Phase Unbalance) / "C.un" (Current Unbalance) trip point is greater than 15% then hysteresis upper limit will be 15% & lower limit will be 1%.

TABLE 4 (A): Voltage Relay

Parameters	Upper Limit	Lower limit
OV (Over Voltage)	15%	1%
UV (Under Voltage)	15%	1%
OF (Over Frequency)	15%	1%
UF (Under Frequency)	15%	1%
Ph.F (Phase Fail)	15%	1%

TABLE 4 (B): Current Relay

Parameters	Upper Limit	Lower limit
OC (Over Current)	15%	1%
UC (Under Current)	15%	1%
C. Los (Current Loss)	15%	1%

If "Ph.un" (Phase Unbalance) / "C.un" (Current Unbalance) trip point is less than 15% then hysteresis upper limit will be "trip point - 1" & lower limit will be 1%.

Example: -

For "OV" (Over Voltage) PT Secondary = 100 $V_{L-L.}$

Trip point = 105% (105 V_{L-L}) Hysteresis = 2% (2 $V_{L-L.}$)

Relay Reset = Trip point - Hysteresis = 105 - 2, = 103 $V_{L-L.}$

Example: -

For “Ph.un” (Phase Unbalance)

PT Secondary = 100 $V_{L-L.}$

Trip point = 10% (10 V_{L-L})

Hysteresis = 2% (2 $V_{L-L.}$)

Relay Reset =Trip point - Hysteresis

= 10 - 2

= 8 $V_{L-L.}$

Note: - For safety reasons, if relay has already tripped then it will not reset unless all phases are healthy i.e above or below hysteresis value (as the case may be). This is to prevent unnecessary relay chattering.

Fig No: - 42

Fig No: - 43

Fig No: - 44

4.1.3.6 Relay Assignment

This screen allows user to assign any fault to any relay options like "none" (No), "rL1" (Relay 1), "rL2" (Relay2), "rL12" (Relay with two change Over Contacts).

Pressing “▲” or “▼” key, meter will enter into edit mode.

Example: -

To assign Relay 1 to any fault parameter follow the steps.

When on screen (fig) 42 press▲” key to get “rL1” (Relay 1) as shown in fig 43. On pressing “ ENTER ” key Relay 1 will be assigned as shown in fig 44.

On again pressing “ENTER” key meter will confirm newly assigned relay & go to “quit” (quit from parameter selection menu) refer section 4.1.3.7.

Fig No: - 45

4.1.3.7 Quit

On pressing "ENTER" key meter will quit (Exit) from parameter selection menu.

Fig No: -46

4.1.3.8 IDMT (Inverse Definite Minimum Time) (Current Relay only)

This Screen (Fig) 46 " id-t "(IDMT) allows user to assign IDMT to only "OC" (Over Current) fault parameter.
For IDMT curves refer Table 5.

TABLE 5:

Relay Characteristics type	α	C
Standard Inverse (n.inU)	0.02	0.14
Very Inverse (U.inU)	1	13.5
Extremely Inverse (E.inU)	2	80
Long Inverse (L.inU)	1	120

To calculate Relay Operating time when IDMT is enabled, use the following formula.

$$T = \frac{C}{\left(\frac{I}{Is}\right)^{\alpha} - 1} \times TMS$$

Where,
T = Time in Sec (Operating time of relay).
I = Input Current.
Is = Secondary Current.
TMS = Time multiplier setting.

C = Constant for relay characteristics.
α = Constant representing inverse time type (α > 0)

Fig No: - 47

Fig No: -48

On pressing " ENTER " key meter will show previously enabled or disabled IDMT.
To enable IDMT follow the steps: -
Pressing "▲" or "▼" key, meter will enter into edit mode
Press "▲" key to get "YES" on screen as shown in fig 47.

On pressing " ENTER " key IDMT will be enabled as shown in fig 48.
On again pressing "ENTER" key enabled parameters will be confirm & go to ("trip" Trip point setting refer section 4.1.3.3

Fig No: -49

4.1.3.8.1 TMS (Time multiplier setting)

Screen (Fig) 49 " t.SEt " (Time multiplier setting) allows user to Set TMS value ranging from 0.1 to 1.

On pressing "▲" or "▼" key, meter will enter into edit mode.
Pressing " ▲" key increments digit value & Pressing "▼" key decrements digit value.

TABLE 6:

	Upper limit	Lower limit
TMS	1	0.1

After setting TMS value meter will go to curve selection refer section 4.1.3.8.2

4.1.3.8.2 Curve selection

Fig No: -50

Screen (Fig) 50 " CurU " (Curve selections) allows user to select 4 different Curves for only "OC" (Over Current) fault parameter.

Fig No: -51

After "CurU" meter will show previously stored curve as shown in fig 51.

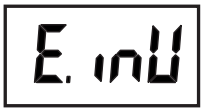


Fig No: -52

Curve Selection mode:-

Pressing "▲" or "▼" key, meter will enter into edit mode.

Example: -

For Selecting extremely inverse curve, follow the steps: -
Press "▲" key to get "E.inV" (Extremely inverse curve) as shown in fig 52.

Fig No: -53

On pressing " ENTER " key Extremely inverse curve will be selected as shown in fig 53.

On again pressing "ENTER" key meter will confirm selected curve & go to Relay selection mode. (refer section 4.1.3.6)

Note: When a curve is selected the corresponding, α and C constants get assigned automatically.

Fig No: - 54

4.1.4 Relay Setup Menu

This menu " rELY " (Relay) allows user to configure different relay related parameters.

When on "rELY" menu as shown in fig 54.
Press " ENTER " key to enter into relay related parameters selection screen.
Press "▲" key or "▼" key to move through relay related parameters
By pressing "ENTER" key User can select the desired parameters.
Different options in this menu are "Pon.d" (Power ON delay) (refer section 4.1.4.1), "rSt.d" (Reset delay) (refer section 4.1.4.2), "rSt.C" (Reset Control) (refer section 4.1.4.3), "COnF" (Relay Configuration) (refer section 4.1.4.4), "rEL.C" (Relay Control) (refer section 4.1.4.5), "And" (AND) (refer section 4.1.4.6).

4.1.4.1 Power ON Delay

Fig No: - 55

This screen allows user to set Power ON delay from 0.5 Sec to 30 Sec.
Pressing "▲" or "▼" key, meter will enter into edit mode.
Pressing"▲" key increments digit value & Pressing " ▼" key decrements digit value.

Pressing "ENTER" key will confirm new Power ON delay.
Power ON Delay will be applicable only once when the meter is powered ON, and both relays rL1 & rL2 remain in tripped state during delay.
After setting new Power On delay meter will go back to Power on delay screen (refer section 4.1.4.1)

TABLE 7:

	Upper Limit	Lower limit
Power ON Delay	30	0.5

4.1.4.2 Reset Delay

Fig No: - 56

This screen allows user to set Reset Delay from 0.2 Sec to 30 Sec.

The Reset delay starts when a relay is in tripped state and no fault is present on that particular relay, the faulty state of relay is maintained for the set Reset delay and then relay contacts switch to initial state.
Pressing "▲" or "▼" key, meter will enter into edit mode. Pressing "▲" key increments digit value & Pressing"▼" key decrements digit value.
Pressing "ENTER" key will confirm new Reset delay.
After setting new Reset delay meter will go back to Reset delay screen (refer section 4.1.4.2)

TABLE 8:

	Upper Limit	Lower limit
Reset Delay	30	0.2

4.1.4.3 Reset Control

Fig No: - 57

Screen (Fig) 57 " rSt.C " (Reset Control) allows user to set whether relay should reset Automatically or wait for manual reset by user.

Fig No: - 58

In Auto mode Meter will automatically reset relay in healthy condition only.
In manual mode user can manually reset relay.
On pressing "ENTER" key meter will show previously stored Auto / manual mode. As shown in fig 59 Auto mode is enabled.

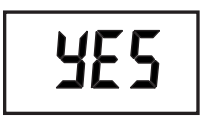


Fig No: - 59

Example: -
Assign Relay Reset control in manual mode.
Pressing "▲" or "▼" key, meter will enter into edit mode.

To disable Relay reset control in auto mode follow the steps.
Press "▲" key to get "no" as shown in fig 60.
On pressing " ENTER " key Relay Reset control will be in manual mode.

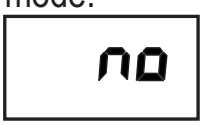


Fig No: -60

After setting new Relay Reset control meter will go back to Relay reset control screen (refer section 4.1.4.3)

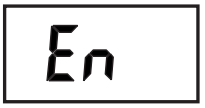


Fig No: - 61

4.1.4.4 Relay Configuration

This menu allows user to configured relay in energized or de-energized mode.
On Pressing "ENTER" key meter will show previously configured relay.

Example: -
Assign relay in energized mode.
Pressing "▲" or "▼" key, meter will enter into edit mode.
Press "▲" key to get "En" (energized mode) as shown in fig 61.
On pressing " ENTER " key Relay will be configured in energized mode
After setting new Relay configuration meter will go back to Relay configuration screen (refer section 4.1.4.4)
Note: - similarly user can configure relay in "dE.En" de- energized mode.

4.1.4.5 Relay Control

Fig No: - 62

This screen allows user to assign individual relay to trip mode or to buzzer mode.
On pressing Reset key / ▼, if meter is in trip mode the relay will reset only when no fault is present, whereas in buzzer mode the particular relay will reset immediately even if fault is present.
On Pressing "ENTER" key meter will show "rL1" (relay 1) as shown in fig 62 & previously configured relay control mode.
Example: -
After "rL1", for Assigning relay1 to trip mode follow the steps.
Pressing "▲" or "▼" key, meter will enter into edit mode.

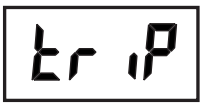


Fig No: - 63

Press "▲" key to get "trip" (trip mode) as shown in fig 63.
On pressing " ENTER " key, relay 1 will be assigned to trip mode as shown in fig 64.

Fig No: - 64

After setting new Relay control mode, meter will go back to Relay Control screen (refer section 4.1.4.5)

4.1.4.6 AND

Fig No: - 65

Fig No: - 66

Screen (Fig) 65 " And " (AND) function allows user to assign ANDing between two fault parameters i.e Relay will trip only if both faults are present.
Press "ENTER" key screen will show previously stored enabled or disabled AND function.
To enable AND function press "▲" key to get "YES" on screen as shown in fig 66.

Example: -
For Voltage Relay
For assigning "OV" as first input to anding function and "OF" as second input to anding function **OR**

Fig No: - 67

Fig No: - 68

Fig No: - 69

Fig No: -70

Fig No: -71

Fig No: - 72

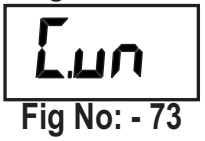


Fig No: - 73

For Current Relay
For assigning "OC" as first input to anding function and "C.un" as second input to anding function follow the steps-

On pressing " ENTER " key screen will show "1st" (First) as shown in fig 67.

This screen allows to set first parameter for ANDing.
After this meter will show first fault parameter.
Press "▲" key to get "OV" (Over Voltage) as shown in fig. 68 or "OC" (Over current) as shown in fig 69.
On pressing " ENTER " key "OV" or "OC" will be assigned as first input to ANDing function shown in fig 70.

On again pressing "ENTER" key meter will confirm first ANDing input & go to "2nd" (Second input) as shown in fig. 71.

This screen allows user to set second parameter for ANDing.

Press "▲" key to get "OF" (Over Frequency) as shown in fig 72 or "C.un" (Current unbalance) shown in fig 73.

Fig No: -74

On pressing " ENTER " key "OF" or "C.un"will be assigned as second input to ANDing function shown in fig 74. After setting two fault parameters to AND function meter will go back to AND (refer section 4.1.4.6)

Note:-

1. Only the enabled parameters will be available for AND function.
2. In case of AND function, if two ANDing faults occur at the same time the trip delay will be maximum of the two.
3. If any one ANDing parameter is disabled, then AND function will get disabled & Relay will be Reset.

Fig No: - 75

4.1.4.7 Quit

On pressing "ENTER" key meter will quit (Exit) from Relay SET UP menu .

Fig No: - 76

4.1.5 Reset menu

Screen (Fig) 76 " rESt " (Reset) function allows user to reset High, Low voltage OR current values, Frequency, stored faults.

Fig No: - 77

Press "ENTER" key screen will show "nonE" (No) as shown in fig 77.

Fig No: - 78

Press " ▲" key or " ▼" key to move through options in Reset Menu.

Fig No: - 79

Options in Reset menu are: -

none: - No
ALL - All values.
Hi - High values.
Lo - Low values.
FLtS - Stored Faults.

Fig No: - 80

Fig No: -81

By pressing " ENTER " key User can Reset values from the selected options.

Fig No: - 82

4.1.6 Quit Screen

On pressing "ENTER" key meter will quit (Exit) from main menu.

4.2 Faults

Fig No: - 83

4.2.1 Fault Number

Screen (Fig) 83 " FALt " (Fault) shows stored faults & corresponding response value.
When on "FALt" menu as shown in fig 83,

pressing "▲" key OR "▼" will go to "quit" (quit) menu refer section 4.2.2 as shown in fig 86.
When on "quit" menu as shown in fig 86, pressing "▲" key OR "▼" will go to "FALt" (Fault) menu refer section 4.2.1 as shown in fig 83.

Fig No: - 84

When on fault menu, pressing "ENTER" key meter will show "Ft.no" (Fault numbers) as shown in fig 84. This function will show Last 15 faults.

Example: - To know the name of first fault & it's details follow the steps: -
Pressing "▲" or "▼" key, meter will enter into edit mode.

Fig No: - 85

Pressing "▲" key increments digit value & Pressing "▼" key decrements digit value.

To access this Set Up press "Enter" key, meter will show "Ft.01" (Fault1) as shown in fig 85. (* denotes decimal point is flashing).
On pressing "ENTER" key meter will show fault name.
Pressing "▲" or "▼" key, meter will show all fault parameters values.

Note: - Faults are stored in First In First Out (FIFO) order which means the latest fault is always stored on first location and previous faults get shifted downwards.

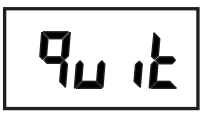


Fig No: - 86

4.2.2 Quit

On pressing "ENTER" key meter will quit (Exit) from fault menu & go to measurement parameters menu.

Fig No: -87

4.3 Other Indications

When input exceeds 127% of PT Secondary in **Voltage Relay** OR 145% of CT Secondary in **Current Relay**, meter will show "-OL-" (Over Load) as shown in fig 87.

If no input is present and Hi / Lo parameters are reset, then High frequency & Low frequency will show "----" as shown in fig 88.

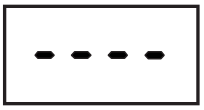


Fig No: -88

Caution: - Input should not exceed upper limits of Current OR Voltage specified above.

Fig No: - 89

5. OTHER FEATURES

5.1 Test Relay operations

"tESt" (Test) feature allows user to test relay operation when healthy inputs are applied i.e no fault is present.

To Test relay operations follow the steps: -

On pressing "TEST /▲" key for 3 seconds, all relay contacts will switch positions & Relay1, Relay2 LEDs will turn ON, and on releasing will return to initial state.

5.2 Manual Reset

When "Reset / ▼ " key is pressed continuously for 3 Sec the manual reset will be acknowledged and when the fault condition is no longer present, the relay will automatically reset.

6. DEFAULT SETTINGS / On FACTORY RESET

TABLE 9 (A): Current Relay

Parameters	Default values
System Type	3
CT Primary	5 A
CT Secondary	5 A
System Frequency	50 Hz
Over Current Trip point	110%
Under Current Trip point	80%
Current Loss Trip point	20%
Current Unbalance Trip point	20%

Parameters	Default values
Trip Delay	1 sec
Hysteresis	1%
Power ON Delay	1 sec
Reset Delay	1 sec
Fault activation	0
Relay assignment	1
System Nominal Current	5 A

TABLE 9 (B): Voltage Relay

Parameters	Default values
System Type	3
PT primary / Secondary	415 V
System Nominal Voltage	600 V
System Frequency	50 Hz
Phase Sequence	1-2-3
Over Voltage Trip point	110%
Under Voltage Trip point	80%
Over Frequency Trip point	105%
Under Frequency Trip point	95%

Parameters	Default values
Phase Failure Trip point	20%
Hysteresis	1%
Phase unbalance Trip point	20%
Trip Delay	1 sec
Power ON Delay	1 sec
Reset Delay	1 sec
Fault activation	0
Relay assignment	1

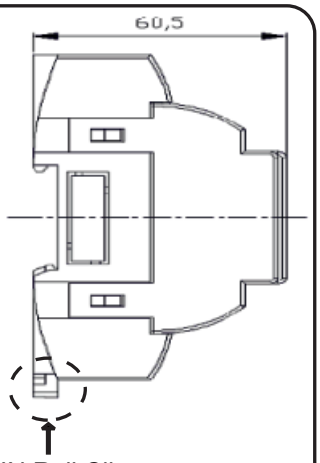
Note :-

1. User can not disable Phase failure parameter.

2. 0: Disabled

1: Enabled

7. INSTALLATION



DIN Rail Clip

Caution

1. In the interest of safety and functionality this product must be installed by a qualified engineer, abiding by any local regulations.
2. Voltages dangerous to human life are present at some of the terminal connections of this unit. Ensure that all supplies a, de-energized before attempting any connection or disconnection.
3. These products do not have internal fuses therefore external fuses must be used to ensure safety under fault conditions.

Protection Relay can be mounted on a top-hat rail or directly on to wall by mounting plate.
The front of the enclosure conforms to IP 20.
The terminals of the product should be protected from liquids.
The Meter should be mounted in a reasonably stable ambient temperature and where the operating temperature is within the range -10 to 55C. ^{0}
Vibration should be kept to a minimum and the product should not be mounted where it will be subjected to excessive direct sunlight.

7.1 EMC Installation Requirements: -

This product has been designed to meet the certification of the EU directives when installed to a good code of practice for EMC in industrial environments, e.g.

1. Screened output and low signal input leads or have provision for fitting RF suppression components, such as ferrite absorbers, line filters etc., in the event that RF fields cause problems.

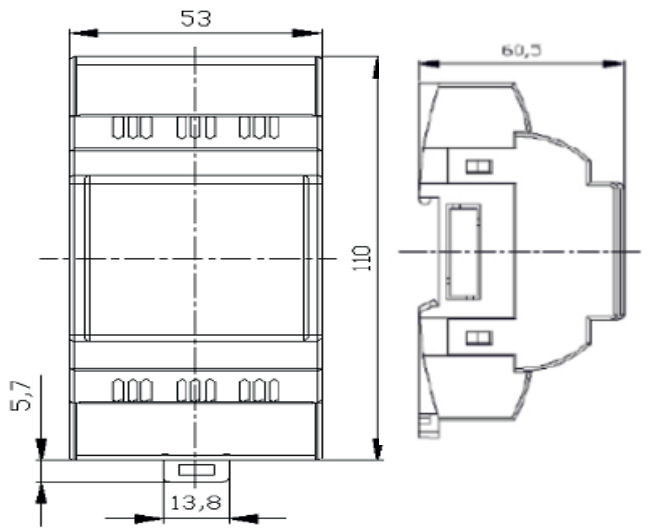
Note:It is good practice to install sensitive electronic instruments that are performing critical functions, in EMC enclosures that protect against electrical interference which could cause a disturbance in function.

2. Avoid routing leads alongside cables and products that are, or could be, a source of grounded. interference.
3. To protect the product against permanent damage, surge transients must be limited to 2kV pk. It is good EMC practice to suppress differential surges to 2kV at the source. The unit has been designed to

automatically recover in the event of a high level of transients. In extreme circumstances it may be necessary to temporarily disconnect the auxiliary supply for a period of greater than 5 seconds to restore correct operation. The Current inputs of these products are designed for connection in to systems via Current Transformers only, where one side is grounded.

4. ESD precautions must be taken at all times when handling this product.

7.2 Case Dimension & Panel Cut Out



7.3 Wiring

Input connections are made directly to screw-type terminals with indirect wire pressure. Numbering is clearly marked on the connector. Choice of cable should meet local regulations. Terminal for both Current and Voltage inputs will accept upto 4mm2 (12AWG) solid or 2.5 mm2 stranded cable. Note : It is recommended to use wire with lug for connection with meter.

7.4 Auxiliary Supply

Meter should ideally be powered from a dedicated supply, however powered from the signal source, provided the source remains within it may be the limits of the Chosen auxiliary voltage range.

7.5 Fusing

It is recommended that all voltage lines are fitted with 1 Amp HRC fuse.

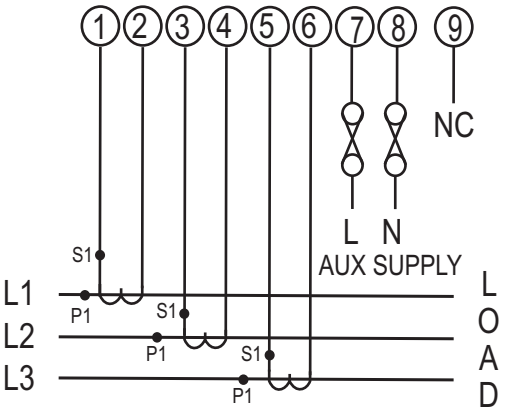
7.6 Earth/Ground Connections

For safety reasons, CT secondary connections should be grounded in accordance with local regulations.

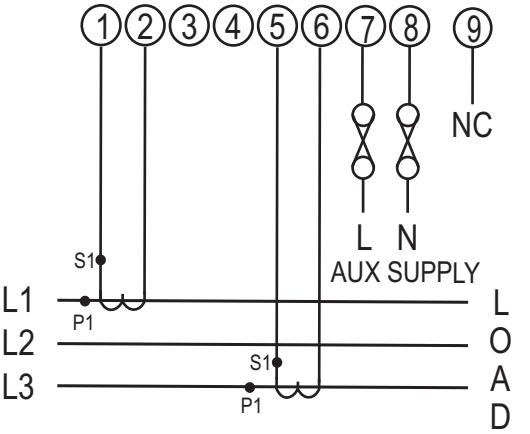
8. CONNECTION DIAGRAMS

Current Relay

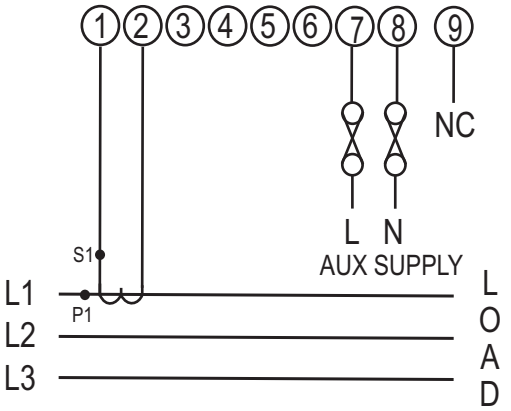
For 3 Phase 4 Wire Unbalanced Load

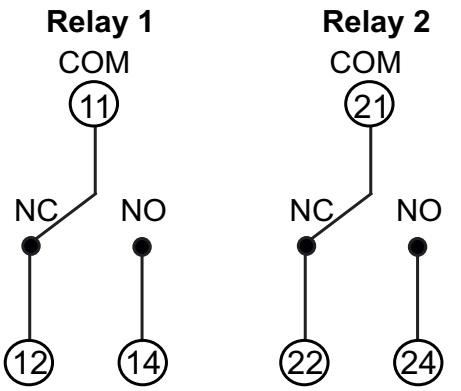


For 3 Phase 3 Wire Unbalanced Load



For 1 Phase 2 Wire Load

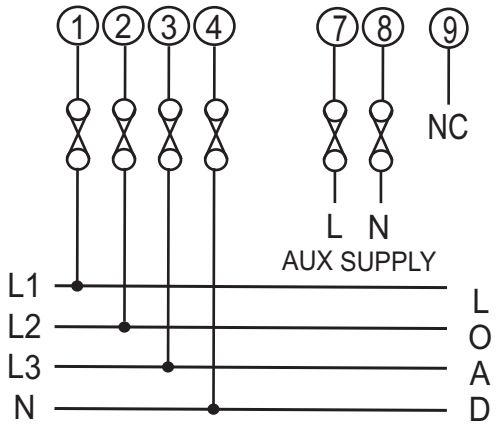




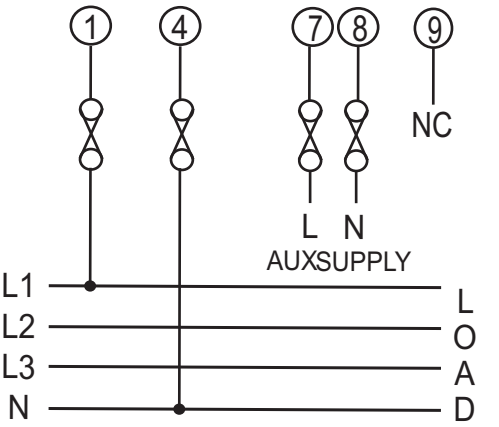
Note- Relay Contacts are shown in power off condition

Voltage Relay

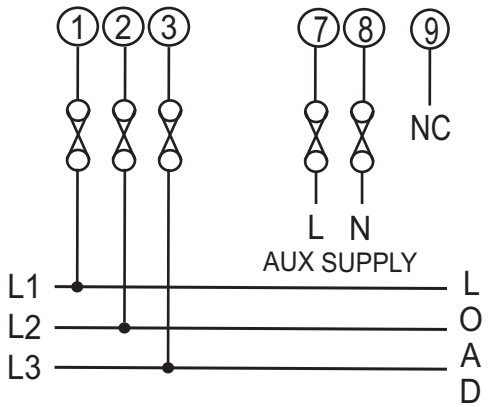
For 3 Phase 4 Wire Unbalanced Load

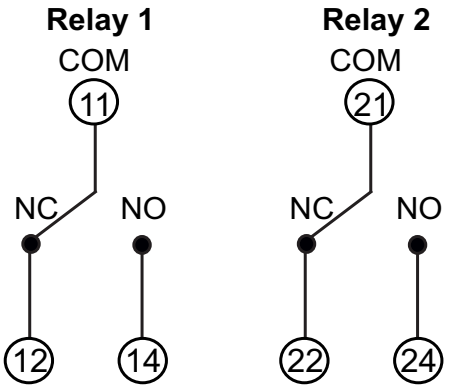


For 1 Phase 2 Wire Load



For 3 Phase 3 Wire Unbalanced Load





Note- Relay Contacts are shown in power off condition

9. TECHNICAL SPECIFICATIONS

Input Voltage

Nominal input voltage (AC RMS)	600 VL-L (346.42VL-N)
System PT Primary Values	100VL-L to 1200 KVL-L programmable on site
System PT Secondary value	100VL-L to 600 VL-L programmable on site
Max continuous input voltage	127% of PT Secondary
Nominal frequency	50 / 60 Hz (programmable on site)
Input voltage burden	< 0.6VA approx.

Input Current

Nominal input current (AC RMS)	5 A
System CT Primary Values	From 1A to 999 KA programmable on site
System CT Primary Values	1A to 5A programmable on site
Max continuous input current	145% of CT Secondary
Input current burden	< 0.25 VA approx. per phase

Auxiliary Supply

External Higher Aux	60 V – 300V AC-DC
Higher Aux Nominal value	230 V AC/DC 50/60 Hz for AC Aux
	OR
External Lower Aux	20 V – 60 VDC / 20 V – 40 VAC
Lower Aux Nominal value	48 VDC / 24 VAC 50/60 Hz for AC Aux
Aux supply frequency	45 to 66 Hz range
Aux supply burden	< 4VA approx.

Overload Withstand

Voltage	2x rated value for 1 second, repeated 10 times at 10 seconds
Current	20x rated value for 1 second, repeated 5 times at 5 min

Operating Measuring Ranges

Voltage Range	20...125% of PT Secondary
Current Range	5...140% of CT Secondary
Frequency	40...70Hz

Reference condition for Accuracy :	
Reference Condition	23°C +/- 2°C
Input waveform	Sinusoidal (distortion factor 0.005)
Input Frequency	50 or 60 Hz ±2%
Auxiliary supply voltage	Nominal Value ±1%
Auxiliary supply frequency	Nominal Value ±1%

Accuracy :	
Voltage	±0.5% of nominal value
Input Current	±0.5% of nominal value
Frequency	±0.2 Hz
Power ON, Trip, Reset Delays	±140 msec or ±5% of Set Delay, Whichever is Greater (WIG)

Influence of Variations:	
Temperature coefficient :	0.025%/°C for Voltage
Temperature coefficient :	0.05%/°C for Current

Applicable Standards:	
EMC	IEC 61326-1:2012, Table 2
Immunity	IEC 61000-4-3. 10V/m min – Level 3 industrial Low level
Safety	IEC 61010-1-2010, Permanently connected use
IP for water & dust	IEC60529
Pollution degree:	2
Installation category:	300V CAT III / 600V CAT II
High Voltage Test	2.2 kV AC, 50Hz for 1 minute between all Electrical circuits.

Environmental :

Operating temperature	-10 to +55°C
Storage temperature	-25 to +70°C
Relative humidity	0... 90% non condensing
Shock	15g in 3 planes
Vibration	10... 55 Hz, 0.15mm amplitude
Enclosure	IP20 (front face only)

Relay Contacts :

Types of output	1CO, 2CO, 1CO+1CO
Contact Ratings (Res. Load)	5A/250VAC/30VDC
Mechanical Endurance	1x10^7 OPS
Electrical Endurance	NO- 3x10^4 OPS NC- 1x10^4 OPS for 1CO / 1CO+1CO relay 1x10^5 OPS for 2CO relay

Mechanical Attributes :

Weight	300g Approx.

NOTE

The information contained in these installation instructions is for use only by installers trained to make electrical power installations and is intended to describe the correct method of installation for this product.
However, 'manufacturer' has no control over the field conditions which influence product installation. It is user's responsibility to determine the suitability of installation method in the user's field condition, 'manufacturer' only obligations are responsibility to determine suitability of the installation method in the user's field conditions.'Manufacturer' only obligations are those in manufacturer standard conditions.
'Manufacturer' only obligations are those in 'Manufacturer' standard condition of sale for this product and in no case will 'Manufacturer' be liable for any other incidental, indirect or consequential damages arising from the use or misuse of the products.

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