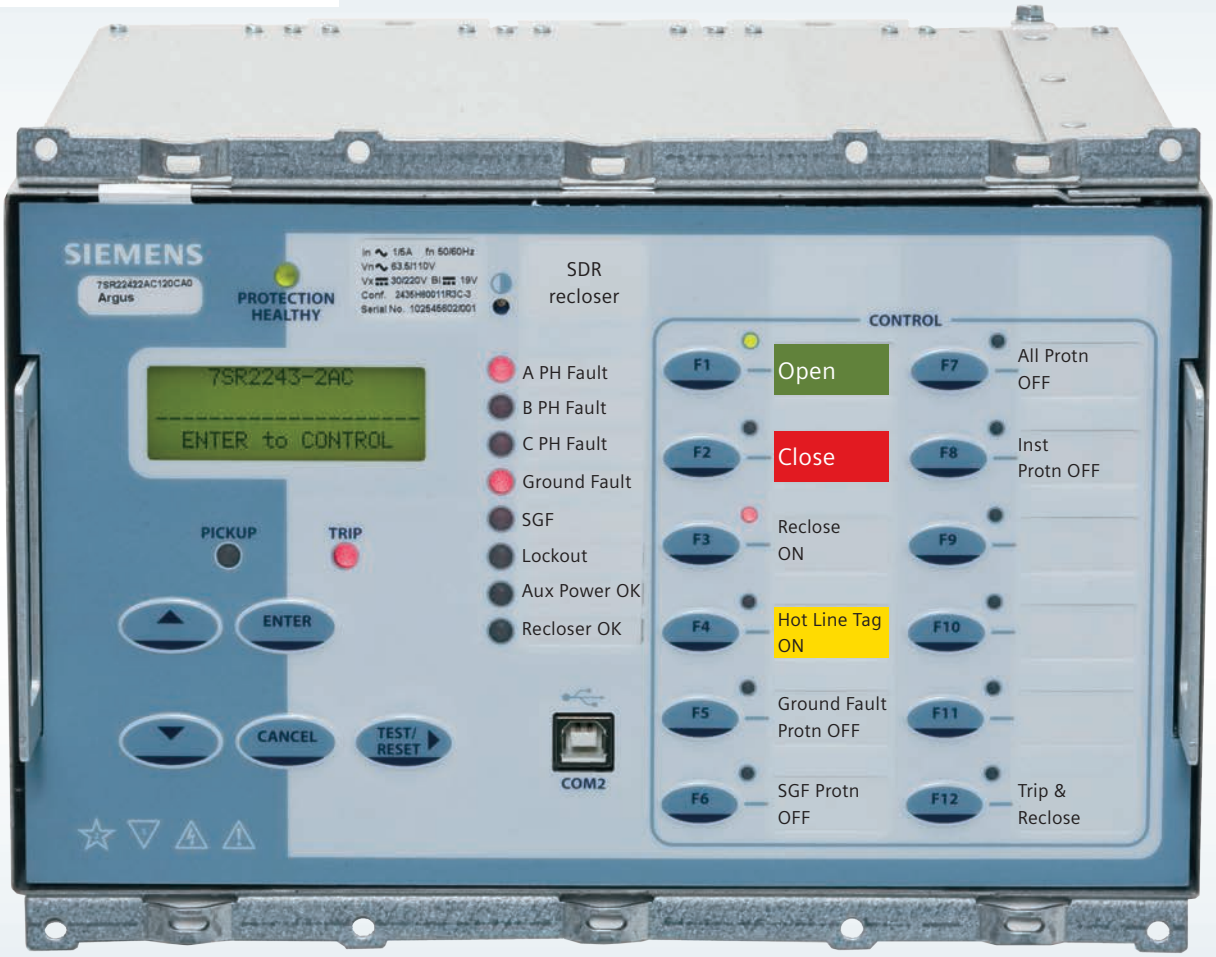
SIEMENS



www.usa.siemens.com/reclosers

Training aid

7SR224 three-phase control relay

Type SDR 15.5 kV to 38 kV three-phase distribution recloser

Answers for infrastructure.

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Type 7SR224 protection and control relay front panel	03
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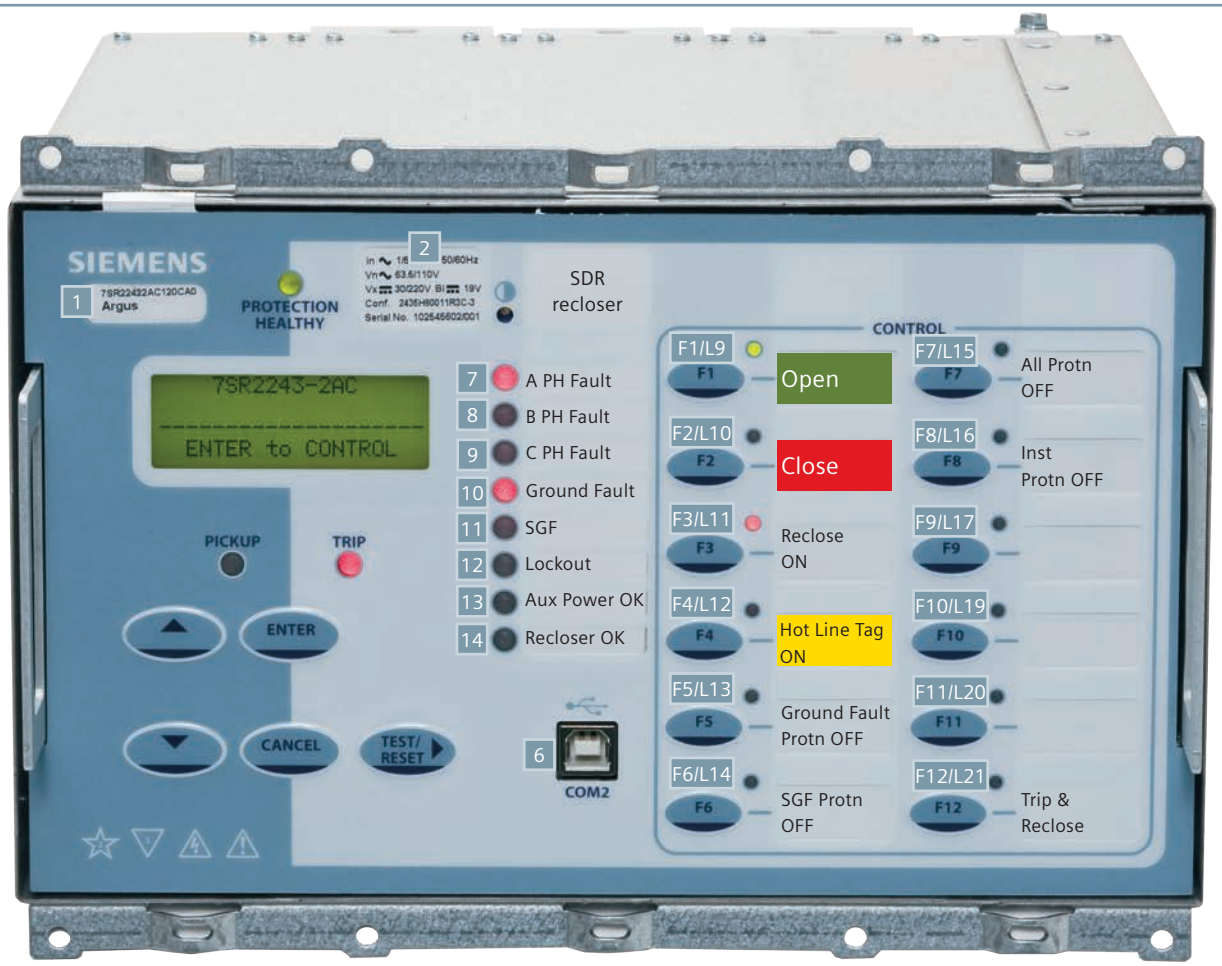
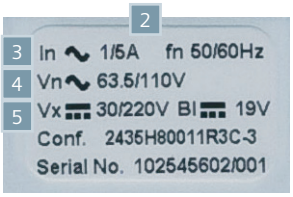


1. MLFB number (model)
2. Ratings label
3. In = CT secondary current
   (In = 1A for type SDR recloser)
   frequency = 50/60 Hz
   (60 Hz for type SDR recloser)
4. Vn = voltage supplied to relay from voltage sensors
   (63.5 for type SDR recloser)
5. Vx = power supply voltage range (48 Vdc for type SDR recloser) and
   BI = voltage to activate a binary input (19 Vdc for type SDR recloser)
6. Programming port



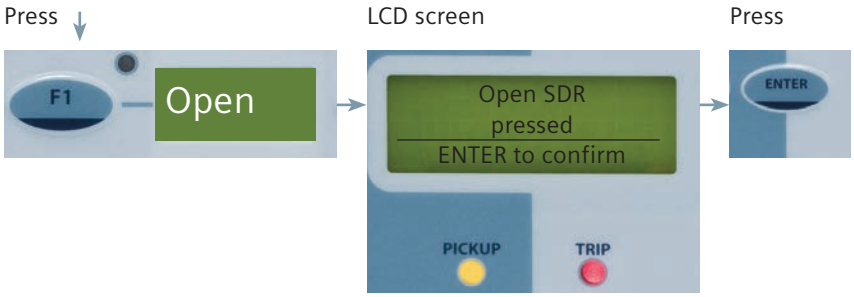
Item	Button and/or LED	If associated LED is lit
7	A PH fault	Phase A target
8	B PH fault	Phase B target
9	C PH fault	Phase C target
10	Ground fault	Ground fault target
11	SEF	Sensitive earth fault (SEF) target
12	Lockout	Recloser is locked out
13	Aux power OK	AC input power to control cubicle OK
14	Recloser OK	Capacitors charged and system ready to close or open

Item	Button and/or LED	If associated LED is lit
F1/L9	Push-to-open recloser	Recloser is OPEN
F2/L10	Push-to-close recloser	Recloser is CLOSED
F3/L11	Push-to-toggle reclose functionality On/Off	Reclose functionality is ON
F4/L12	Push-to-toggle hot line tag On/Off	Hot line tag is ON
F5/L13	Push-to-toggle ground fault protection On/Off	Ground fault protection is OFF
F6/L14	Push-to-toggle sensitive earth fault protection On/Off	SEF protection is OFF
F7/L15	Push-to-toggle all protection On/Off	All protection is OFF
F8/L16	Push-to-toggle instantaneous protection On/Off	Instantaneous protection is OFF
F9/L17	User defined	User defined
F10/L18	User defined	User defined
F11/L19	User defined	User defined
F12/L20	Push-to-trip and reclose recloser	----

Note: If buttons are labeled differently than shown above, factory settings have been reprogrammed.

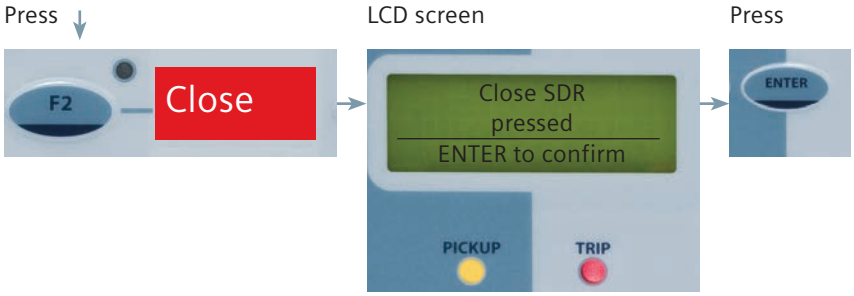
Type 7SR224 protection and control relay operation exercises

Example 1: open recloser



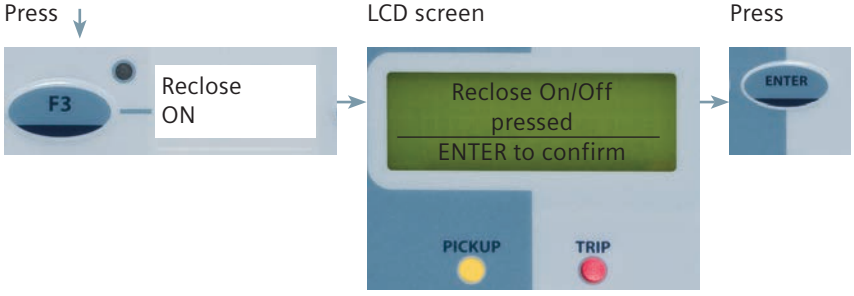
- Recloser will open
- Green LED at F1 will illuminate.

Example 2: close recloser



- Recloser will close
- Red LED at F2 will illuminate.

Example 3: toggle reclosing operation on and off

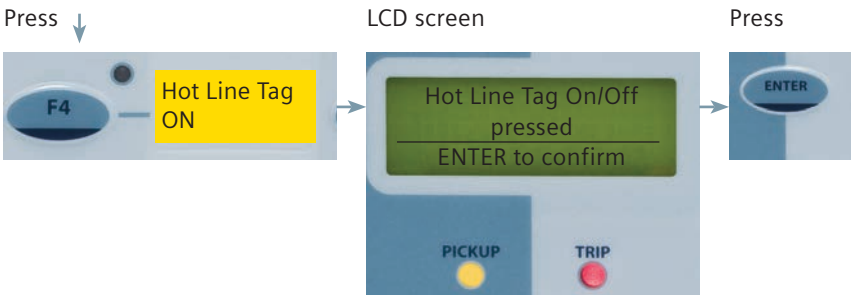


- Recloser will not open or close
- Green LED at F3 will toggle on and off.

LED:

- On = reclosing enabled
- Off = reclosing disabled.

Example 4: toggle hot line tag on and off

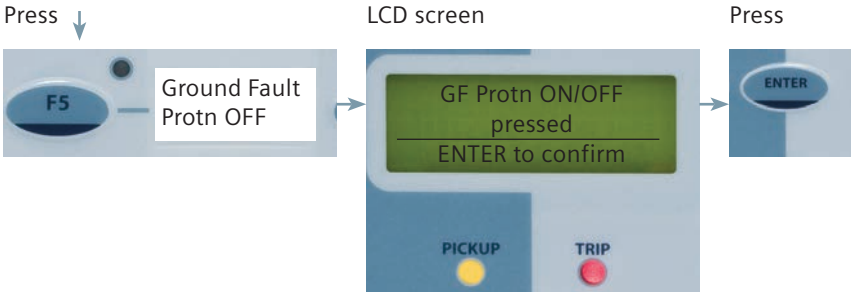


- Recloser will not open or close
- Red LED at F4 will toggle on and off.

LED:

- On = hot line tag enabled
- Off = hot line tag disabled.

Example 5: toggle ground fault protection on and off

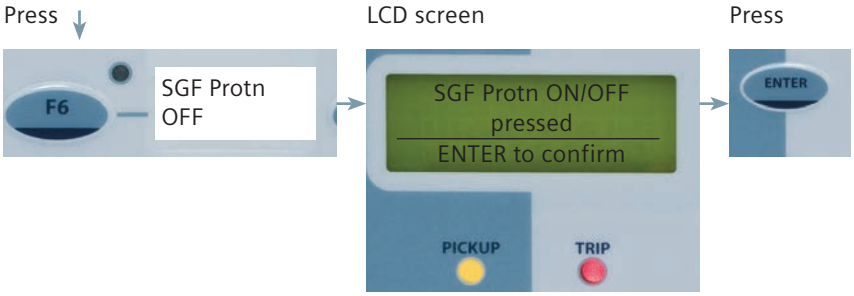


- Recloser will not open or close
- Red LED at F5 will toggle on and off.

LED:

- On = ground fault protection disabled
- Off = ground fault protection enabled.

Example 6: toggle SEF protection on and off

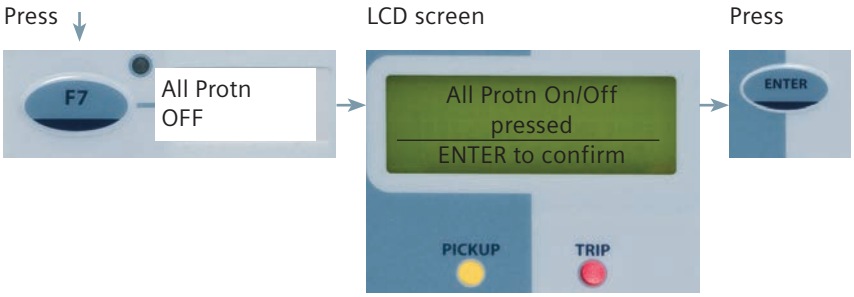


- Recloser will not open or close
- Red LED at F6 will toggle on and off.

LED:

- On = SEF protection disabled
- Off = SEF protection enabled.

Example 7: toggle all protection on and off

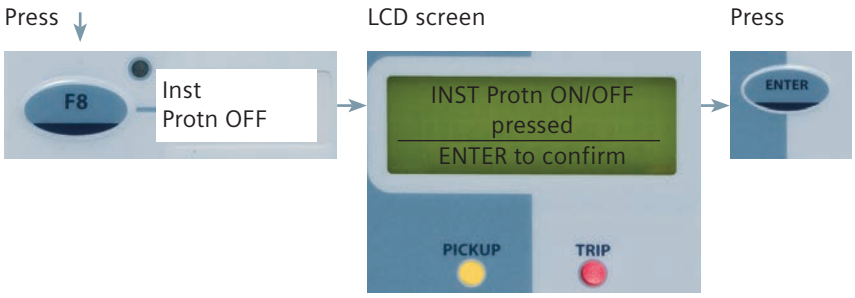


- Recloser will not open or close
- Red LED at F7 will toggle on and off.

LED:

- On = all protection disabled
- Off = all protection enabled.

Example 8: toggle instantaneous (fast) protection on and off



- Recloser will not open or close
- Red LED at F8 will toggle on and off.

LED:

- On = INST (fast) protection disabled
- Off = INST (fast) protection enabled.

Type 7SR224 protection and control relay navigation tree

The following pages will present the navigation tree of the relay settings tree using the navigation buttons.

For all arrows pointing →, press

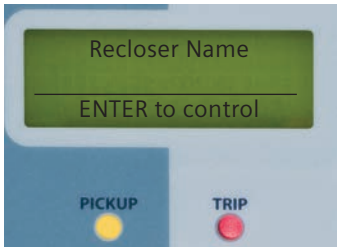
For all arrows pointing ↓, press

To scroll up ↑, press

To go back one level, press

To select, press

For detailed settings mode tree, please refer to page 12.



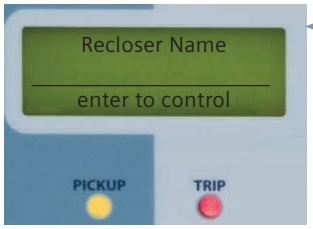
Press

- CONTROL MODE
  - CB: OPEN/CLOSED/TRAVELING
  - AR: Out of Service
  - AR: Trip & Reclose
  - AR: Trip & Lockout
  - Hotline Working IN/OUT
  - G/F Protection IN/OUT
  - SGF Protection IN/OUT
  - Inst Protection IN/OUT
  - Loss of Volts IN/OUT[1]
  - Battery Test
  - Set Local
  - Set L or R
  - Set Remote
  - Set Service
- SETTINGS MODE
  - SYSTEM CONFIG
  - CT/VT CONFIG
  - FUNCTION CONFIG
  - CURRENT PROT'N
  - VOLTAGE PROT'N
  - SUPERVISION
  - CONTROL & LOGIC
  - INPUT CONFIG
  - OUTPUT CONFIG
  - MAINTENANCE
  - DATA STORAGE
  - COMMUNICATIONS
- INSTRUMENT MODE
  - FAVORITE METERS
  - CURRENT METERS
  - VOLTAGE METERS
  - FREQUENCY METERS
  - POWER METERS
  - ENERGY METERS
  - DIRECTIONAL METERS
  - THERMAL METERS
  - AUTORECLOSE METERS
  - LOSS OF VOLTS METERS
  - MAINTENANCE METERS
  - GENERAL ALARM METERS
  - BATTERY CONDITION
  - CAPACITOR CONDITION
  - POWER QUALITY METERS
  - DEMAND METERS
  - BINARY INPUT METERS
  - BINARY OUTPUT METERS
  - VIRTUAL METERS
  - COMMUNICATION METERS
  - MISCELLANEOUS METERS
  - QUICK LOGIC METERS
- FAULT DATA
  - FAULT 1
  - FAULT 2
  - FAULT 3
  - FAULT 4
  - FAULT 5
  - FAULT 6
  - FAULT 7
  - FAULT 8
  - FAULT 9
  - FAULT 10

Footnote:

[1] This function only available with LOV relay option.

Control mode tree



If the LCD screen does not read ENTER to CONTROL, press CANCEL until it does. This will not cause the recloser to operate.

Press ENTER

CONTROL MODE

This is the first of four modes in the relay tree, which bring you to multiple screens that will allow you to control the recloser.

Press ▼

CB: OPEN

To open/close the recloser, the LCD screen will read "CB: OPEN," "CB: CLOSED" or "CB: TRAVELING" indicating the recloser position. Traveling indicates lack of proper position indication. Refer to Troubleshooting table on page 34.

Press ENTER → CB: OPEN / Close|Open / → to select → Press TEST/RESET

Select "Open" or "Close" → CB: OPEN / Confirm Open / ENTER to confirm → Press ENTER

Recloser will open/close.

Press ▼

AR: Out of Service

To toggle auto-reclose on/off, the LCD screen will read "AR: In Service," or "AR: Out of Service" indicating auto-reclose functionality being in or out of service.

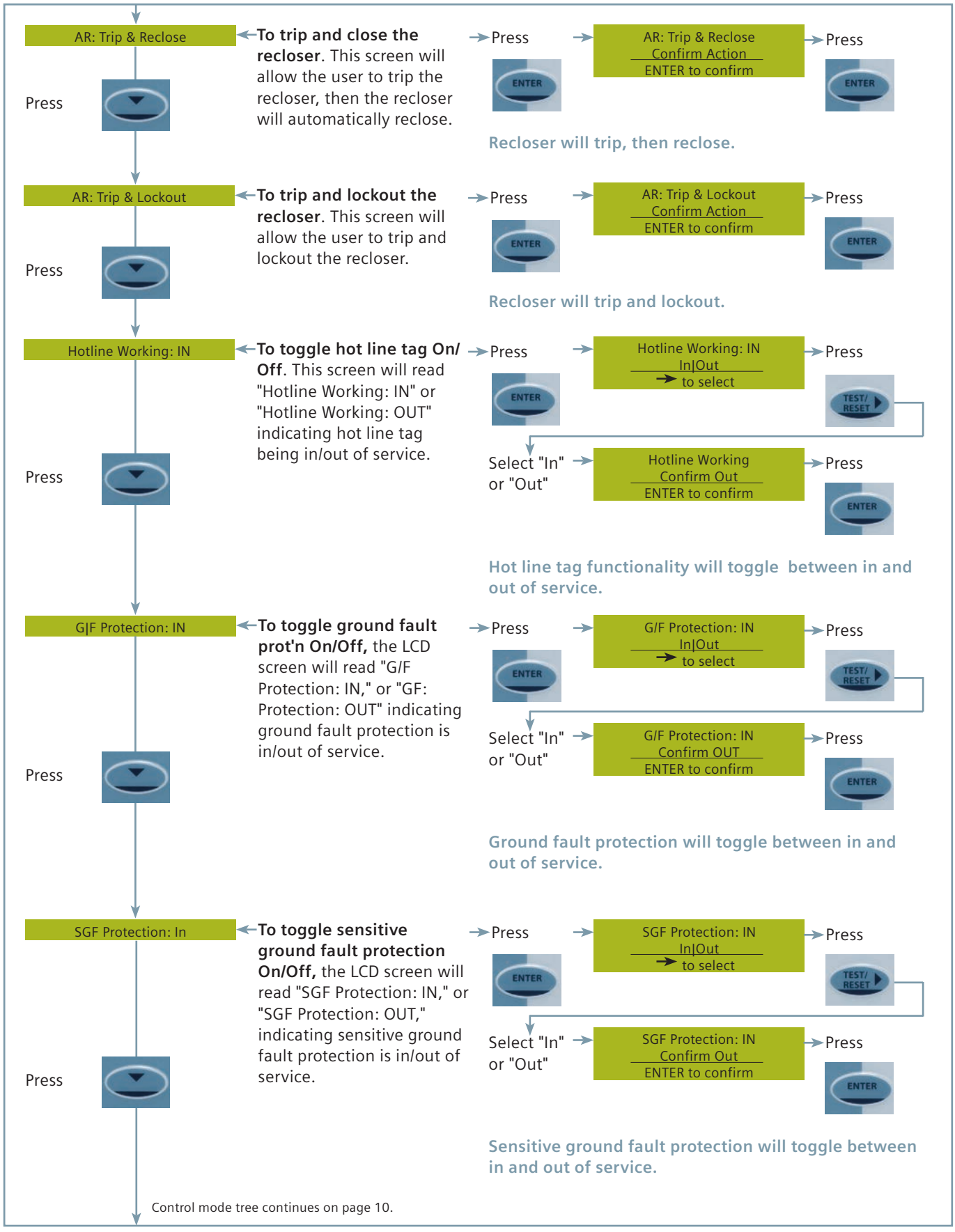
Press ENTER → AR: In Service / In|Out / → to select → Press TEST/RESET

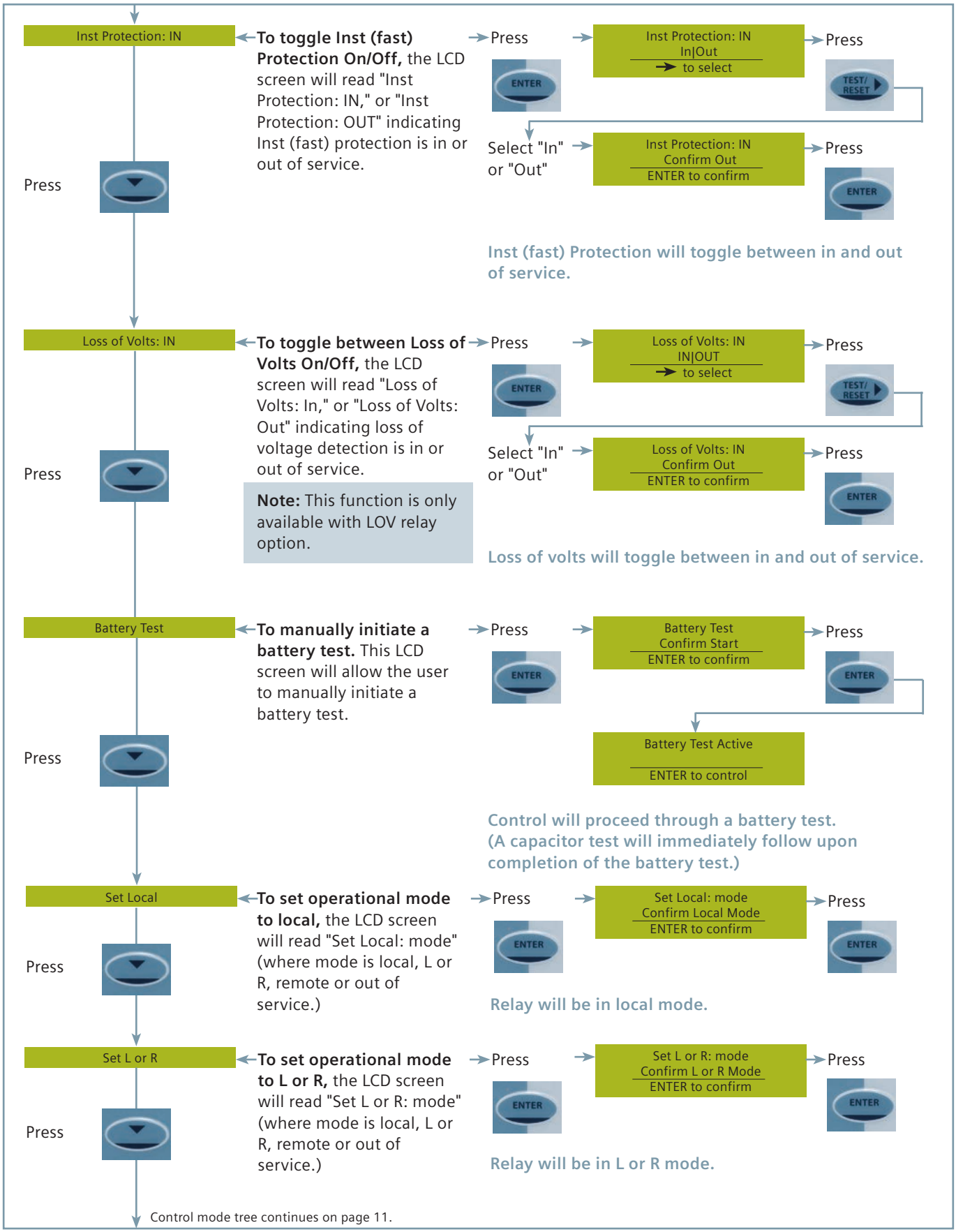
Select "In" or "Out" → AR: In Service / Confirm Out / ENTER to confirm → Press ENTER

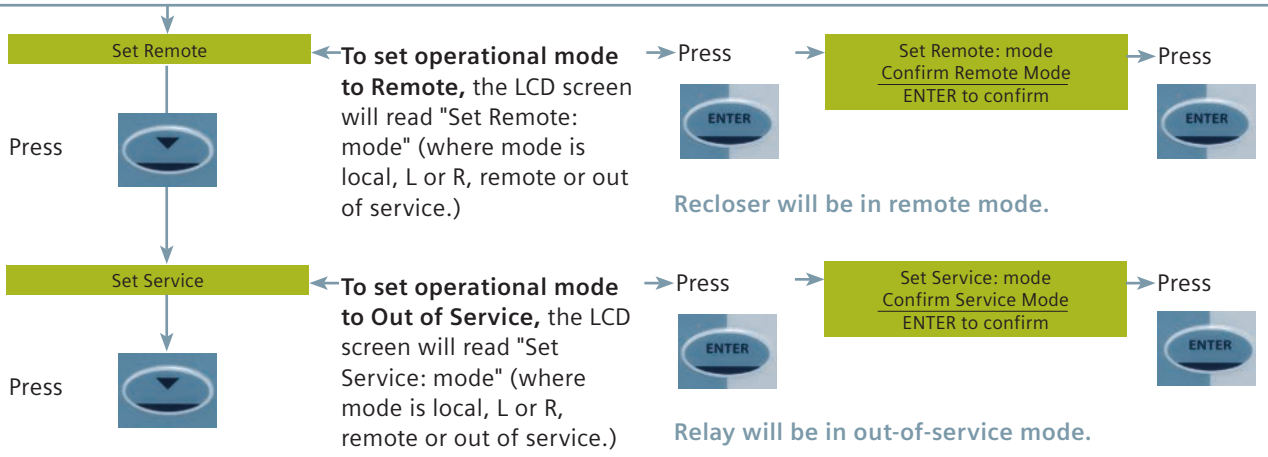
Auto-reclose functionality will toggle between in and out of service.

Press ▼

Control mode tree continues on page 9.

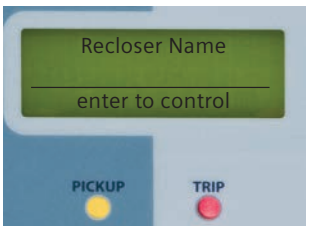

AR: Trip & Reclose
To trip and close the recloser. This screen will allow the user to trip the recloser, then the recloser will automatically reclose.
Press
Press
AR: Trip & Reclose
Confirm Action
ENTER to confirm
Press
Recloser will trip, then reclose.
AR: Trip & Lockout
To trip and lockout the recloser. This screen will allow the user to trip and lockout the recloser.
Press
Press
AR: Trip & Lockout
Confirm Action
ENTER to confirm
Press
Recloser will trip and lockout.
Hotline Working: IN
To toggle hot line tag On/Off. This screen will read "Hotline Working: IN" or "Hotline Working: OUT" indicating hot line tag being in/out of service.
Press
Press
Hotline Working: IN
In|Out
to select
Press
Select "In" or "Out"
Hotline Working
Confirm Out
ENTER to confirm
Press
Hot line tag functionality will toggle between in and out of service.
G|F Protection: IN
To toggle ground fault prot'n On/Off, the LCD screen will read "G/F Protection: IN," or "GF: Protection: OUT" indicating ground fault protection is in/out of service.
Press
Press
G/F Protection: IN
In|Out
to select
Press
Select "In" or "Out"
G/F Protection: IN
Confirm OUT
ENTER to confirm
Press
Ground fault protection will toggle between in and out of service.
SGF Protection: In
To toggle sensitive ground fault protection On/Off, the LCD screen will read "SGF Protection: IN," or "SGF Protection: OUT," indicating sensitive ground fault protection is in/out of service.
Press
Press
SGF Protection: IN
In|Out
to select
Press
Select "In" or "Out"
SGF Protection: IN
Confirm Out
ENTER to confirm
Press
Sensitive ground fault protection will toggle between in and out of service.
Control mode tree continues on page 10.


Inst Protection: IN
To toggle Inst (fast) Protection On/Off, the LCD screen will read "Inst Protection: IN," or "Inst Protection: OUT" indicating Inst (fast) protection is in or out of service.
Press
Press
ENTER
Inst Protection: IN
In|Out
to select
Press
TEST/ RESET
Select "In" or "Out"
Inst Protection: IN
Confirm Out
ENTER to confirm
Press
ENTER
Inst (fast) Protection will toggle between in and out of service.
Loss of Volts: IN
To toggle between Loss of Volts On/Off, the LCD screen will read "Loss of Volts: In," or "Loss of Volts: Out" indicating loss of voltage detection is in or out of service.
Note: This function is only available with LOV relay option.
Press
Press
ENTER
Loss of Volts: IN
IN|OUT
to select
Press
TEST/ RESET
Select "In" or "Out"
Loss of Volts: IN
Confirm Out
ENTER to confirm
Press
ENTER
Loss of volts will toggle between in and out of service.
Battery Test
To manually initiate a battery test. This LCD screen will allow the user to manually initiate a battery test.
Press
Press
ENTER
Battery Test
Confirm Start
ENTER to confirm
Press
ENTER
Battery Test Active
ENTER to control
Control will proceed through a battery test. (A capacitor test will immediately follow upon completion of the battery test.)
Set Local
To set operational mode to local, the LCD screen will read "Set Local: mode" (where mode is local, L or R, remote or out of service.)
Press
Press
ENTER
Set Local: mode
Confirm Local Mode
ENTER to confirm
Press
ENTER
Relay will be in local mode.
Set L or R
To set operational mode to L or R, the LCD screen will read "Set L or R: mode" (where mode is local, L or R, remote or out of service.)
Press
Press
ENTER
Set L or R: mode
Confirm L or R Mode
ENTER to confirm
Press
ENTER
Relay will be in L or R mode.
Control mode tree continues on page 11.



Note: The Out of Service mode will inhibit all local and remote control of relay. To regain local control, refer to Changing the Operating Mode from the settings tree on page 23.

Settings mode tree



Press

CONTROL MODE → Press → SETTINGS MODE ← This is the second of four modes in the relay tree, which bring you to multiple screens that will allow you to control the recloser.

Press

SYSTEM CONFIG ← This menu contains system settings, including language, frequency, date, passwords, etc.

Press

CT/VT CONFIG ← This menu allows the user to change current transformers and voltage transformers settings.

Press

FUNCTION CONFIG ← This menu allows the user to enable or disable functions and features available in the relay.

Press

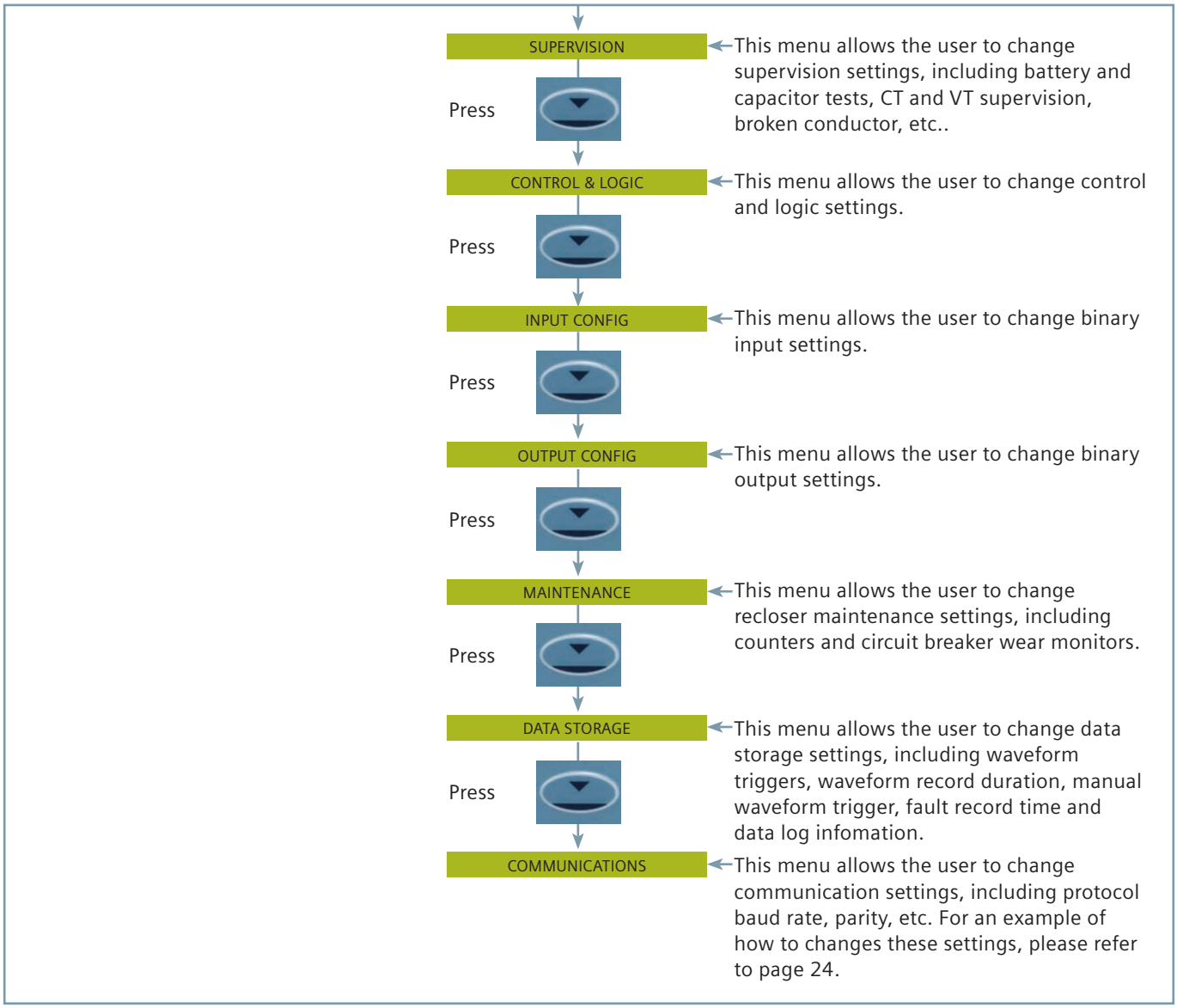
CURRENT PROT'N ← This menu allows the user to change current protection settings. For examples of how to changes these settings, please refer to page 22.

Press

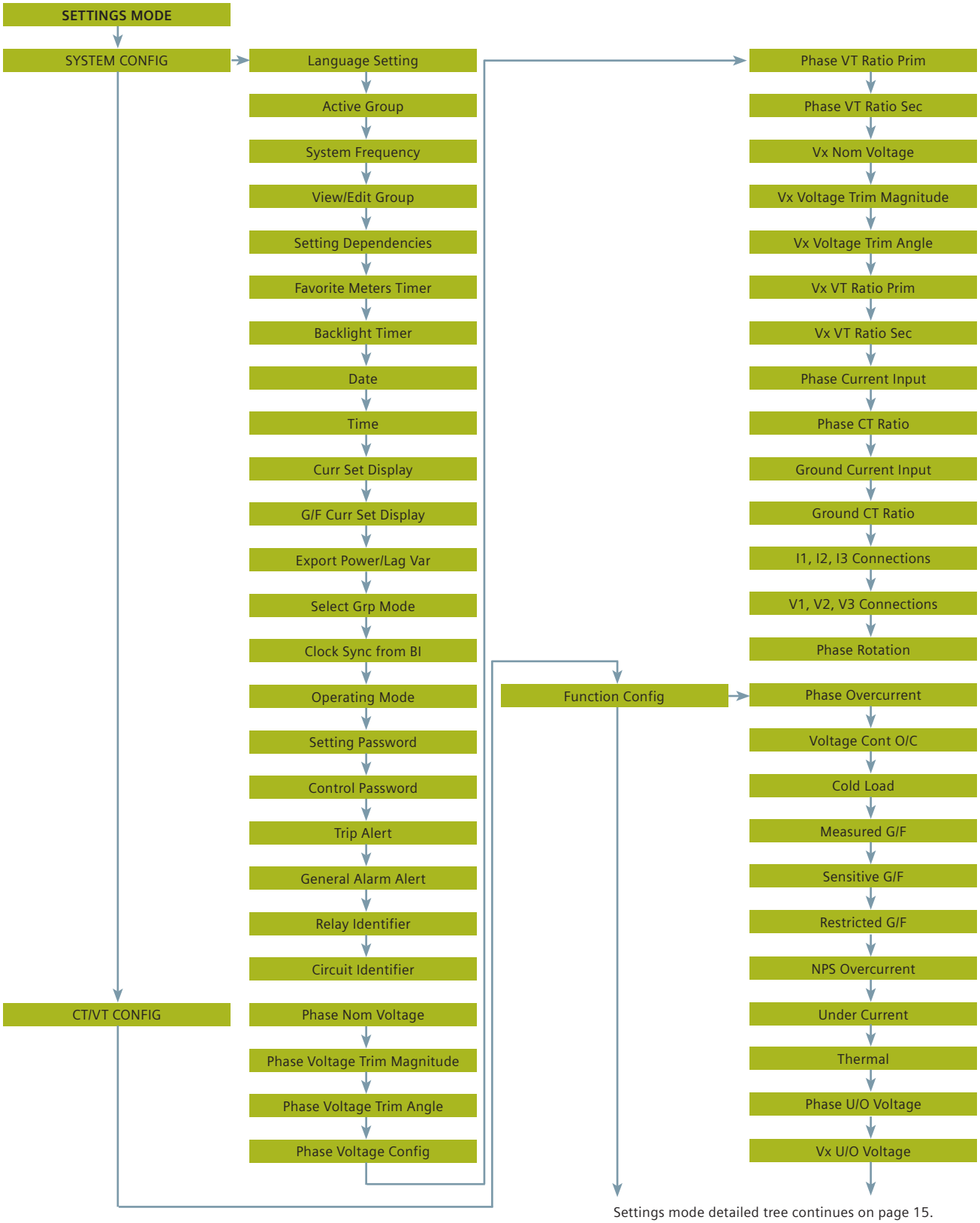
VOLTAGE PROT'N ← This menu allows the user to change voltage protection settings.

Press

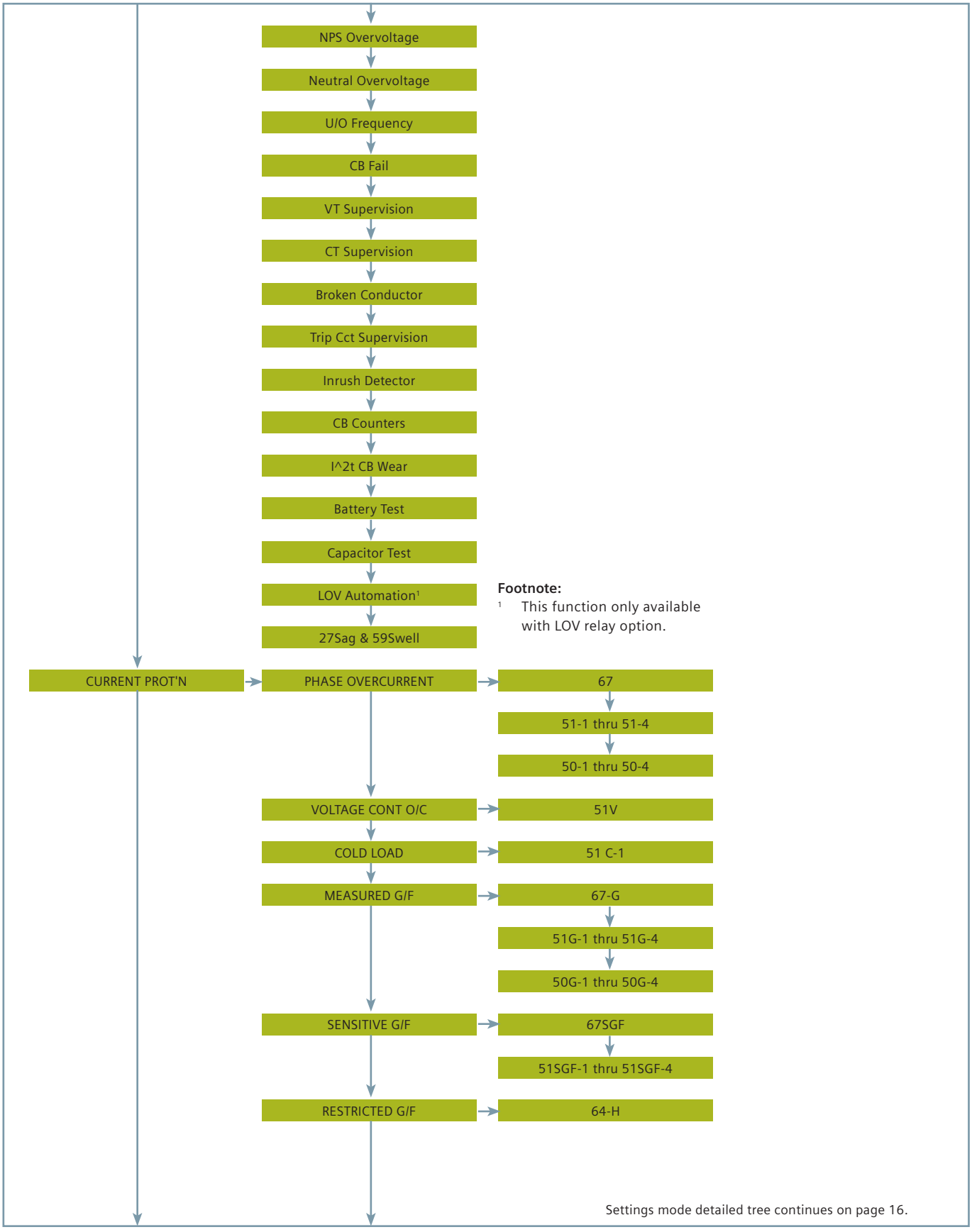
Settings mode tree continues on page 13.


SUPERVISION
This menu allows the user to change supervision settings, including battery and capacitor tests, CT and VT supervision, broken conductor, etc..
Press
CONTROL & LOGIC
This menu allows the user to change control and logic settings.
Press
INPUT CONFIG
This menu allows the user to change binary input settings.
Press
OUTPUT CONFIG
This menu allows the user to change binary output settings.
Press
MAINTENANCE
This menu allows the user to change recloser maintenance settings, including counters and circuit breaker wear monitors.
Press
DATA STORAGE
This menu allows the user to change data storage settings, including waveform triggers, waveform record duration, manual waveform trigger, fault record time and data log infomation.
Press
COMMUNICATIONS
This menu allows the user to change communication settings, including protocol baud rate, parity, etc. For an example of how to changes these settings, please refer to page 24.

Settings mode detailed tree structure



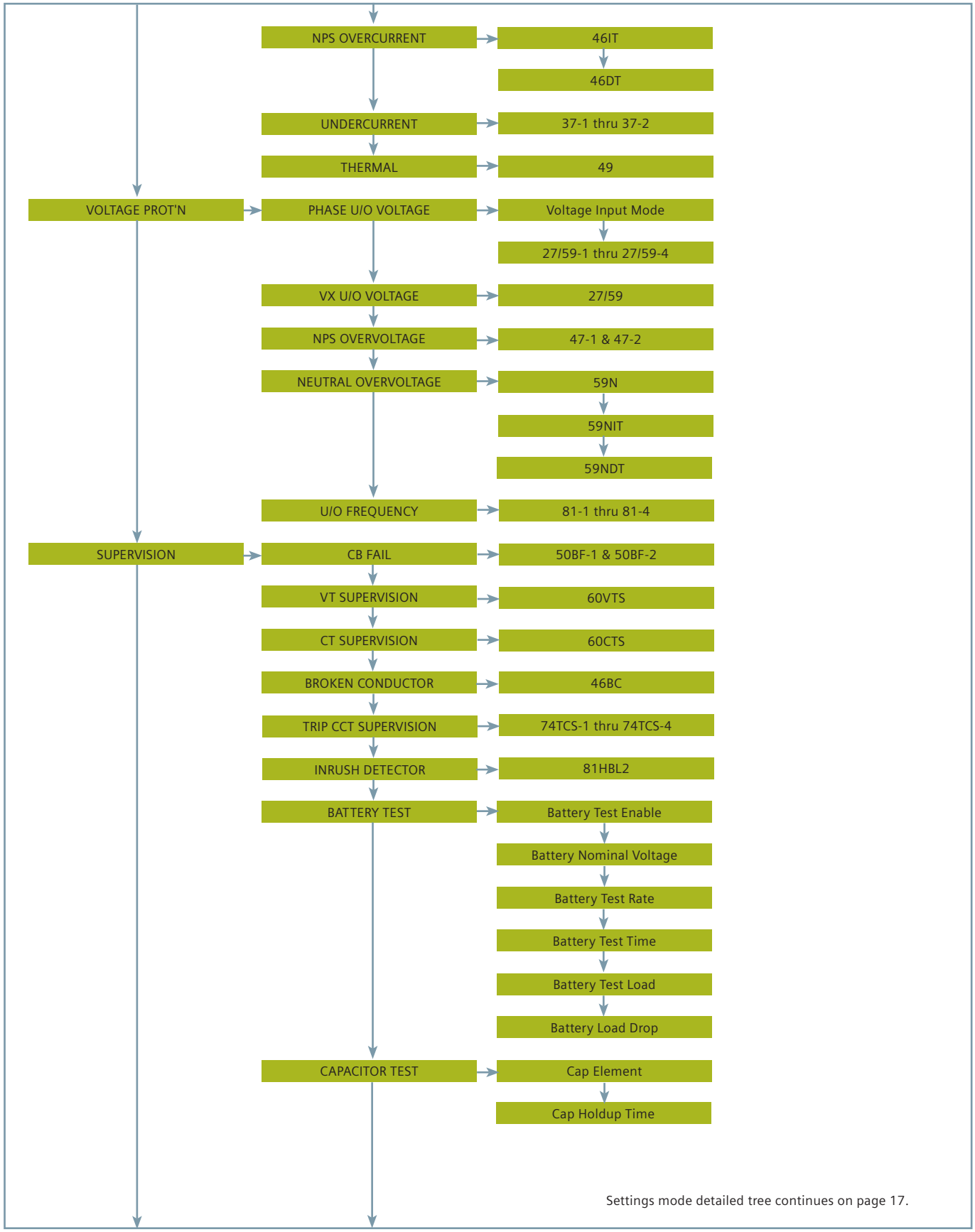
Settings mode detailed tree continues on page 15.



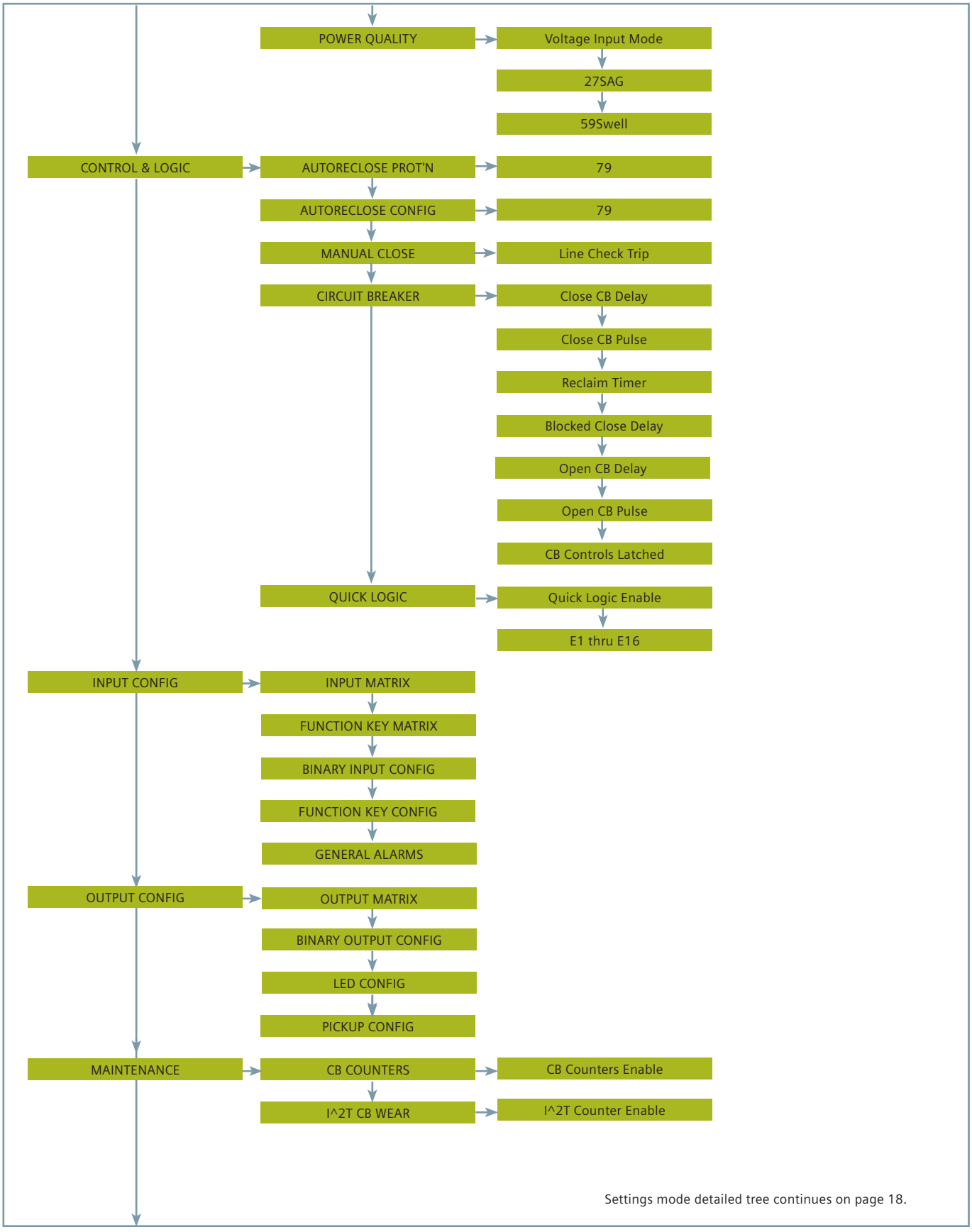
Footnote:

[1] This function only available with LOV relay option.

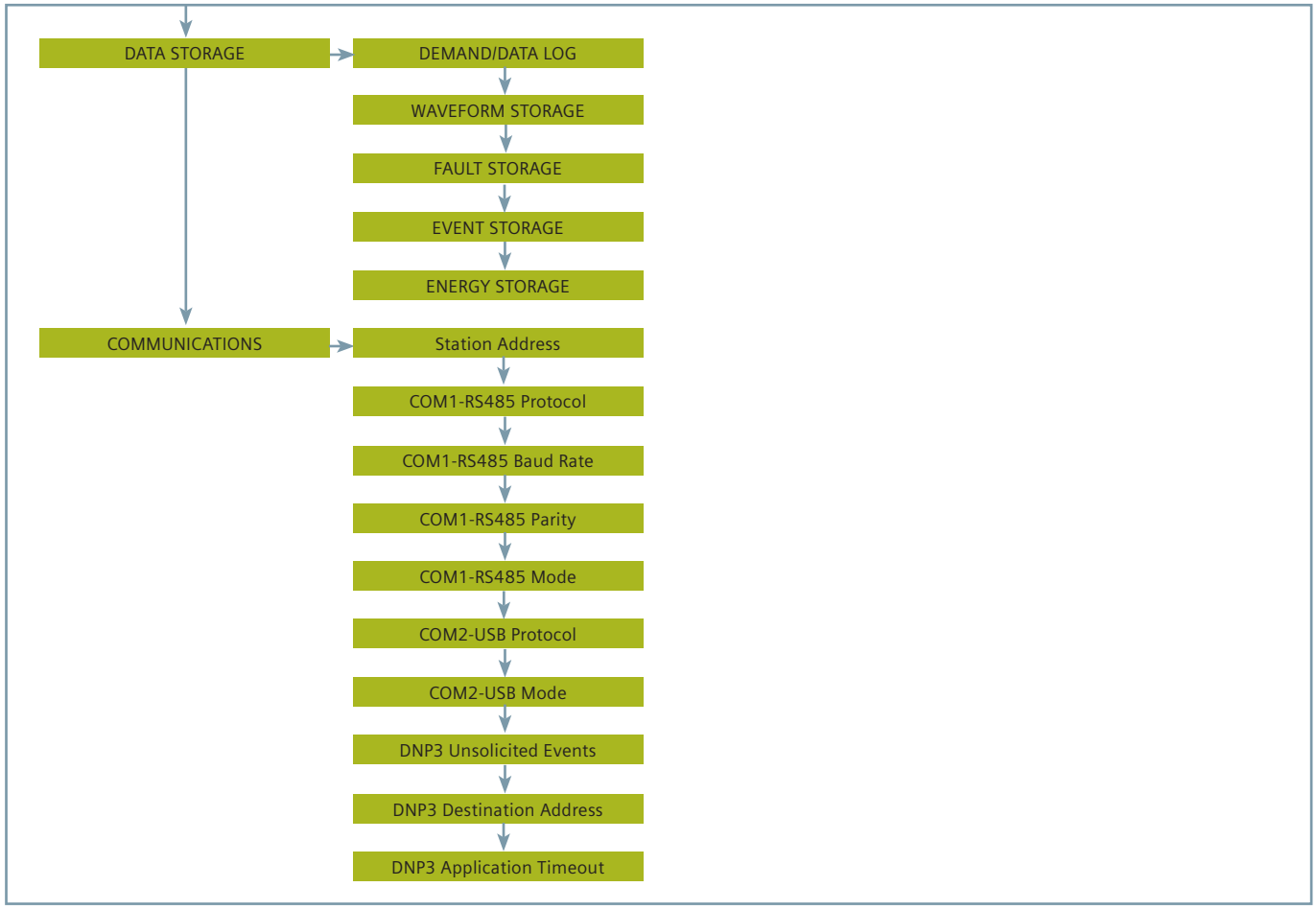
Settings mode detailed tree continues on page 16.



Settings mode detailed tree continues on page 17.

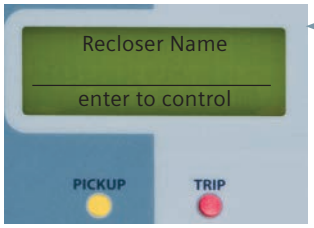


Settings mode detailed tree continues on page 18.


DATA STORAGE
DEMAND/DATA LOG
WAVEFORM STORAGE
FAULT STORAGE
EVENT STORAGE
ENERGY STORAGE
COMMUNICATIONS
Station Address
COM1-RS485 Protocol
COM1-RS485 Baud Rate
COM1-RS485 Parity
COM1-RS485 Mode
COM2-USB Protocol
COM2-USB Mode
DNP3 Unsolicited Events
DNP3 Destination Address
DNP3 Application Timeout

Settings change examples

Example 1: changing the active settings group



← If the LCD screen does not read ENTER to CONTROL, press CANCEL until it does.
This will not cause the recloser to operate.

Press ENTER

CONTROL MODE

Press TEST/RESET

SETTINGS MODE

Press ▼

SYSTEM CONFIG
→ to view

Press TEST/RESET

Active G1
Language Setting
English

Press ▼

Active G1
Active Group
1

Press ENTER

Active G1
Active Group
1
← Blinking

▲ / ▼ ← Press up or down buttons to change active setting group to desired setting group.

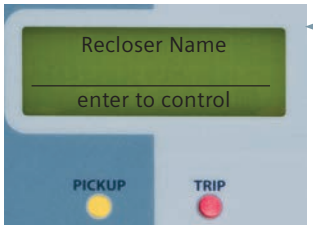
ENTER ← Press ENTER button to accept changes.

Active G2
Active Group
2
← Notice the screen has updated from G1 to G2 indicating the new active setting group.

CANCEL ← When finished making changes, press CANCEL button three times to return to initial ENTER to CONTROL screen.

Done

Example 2: changing the settings group that you are viewing/editing



If the LCD screen does not read ENTER to CONTROL, press

until it does.
This will not cause the recloser to operate.

Press

CONTROL MODE

Press

SETTINGS MODE

Press

SYSTEM CONFIG
→ to view

Press

Active G1
Language Setting
English

Press until the following appears

Active G1
View/Edit Group
1

Press

Active G1
View/Edit Group
1

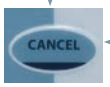
← Blinking

← Press up or down buttons to change active setting group to desired setting group.

← Press ENTER button to accept changes.

Active G1
View/Edit Group
2

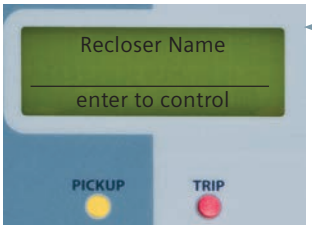
← Notice the screen has updated from G1 to G2 indicating the new active setting group.



← When finished making changes, press CANCEL button three times to return to initial ENTER to CONTROL screen.

Done

Example 3: changing a password



If the LCD screen does not read ENTER to CONTROL, press CANCEL until it does.
This will not cause the recloser to operate.

Press ENTER

CONTROL MODE

Press TEST/RESET

SETTINGS MODE

Press

SYSTEM CONFIG
→ To view

Press TEST/RESET

Active G1
Language Setting
English

Press until the following appears

Press once more to change the control password.

Active G1
Settings Password
Not Active

Press ENTER

Active G1
New Password
_

Blinking

Press up or down buttons to enter a four-digit alphanumeric password.

Press TEST/RESET button to move on digit to the right.

Press ENTER button to accept changes.

Active G1
Confirm Password
_

Repeat previous step.

Active G1
Setting Password
Code = 1682678776

The relay will present a code. Retain this code in case of a lost password. Refer to the instruction manual for the Siemens type 7SR224 recloser control relay (standard control and protection relay option) http://www.usa.siemens.com/reclosers

CANCEL

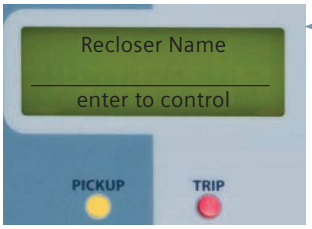
When finished making changes, press CANCEL button three times to return to initial ENTER to CONTROL screen.

You will now be prompted to enter the password once before you can make a setting change. Follow the same process to change the password at the control level.

Done

Note: To deactivate the password feature, change the password to "NONE."

Example 4: changing the pickup level of phase overcurrent element 51-1



If the LCD screen does not read ENTER to CONTROL, press CANCEL until it does.
This will not cause the recloser to operate.

Press ENTER

CONTROL MODE

Press TEST/RESET

SETTINGS MODE

Press until the following appears

CURRENT PROTN → to view

Press TEST/RESET

CURRENT PROTN
PHASE OVERCURRENT → to view

Press TEST/RESET

Active G1 View G1
67 Char Angle
45 deg

Press until the following appears ENTER

Active G1 View G1
51-1 Setting
_x In

Press ENTER

Active G1 View G1
51-1 Setting
_x In

Blinking

Press up or down buttons to change desired pickup level to desired current level.

Press ENTER button to accept changes.

Active G1 View G1
51-1 Setting
_x In

When finished making changes, press CANCEL button four times to return to initial ENTER to CONTROL screen.

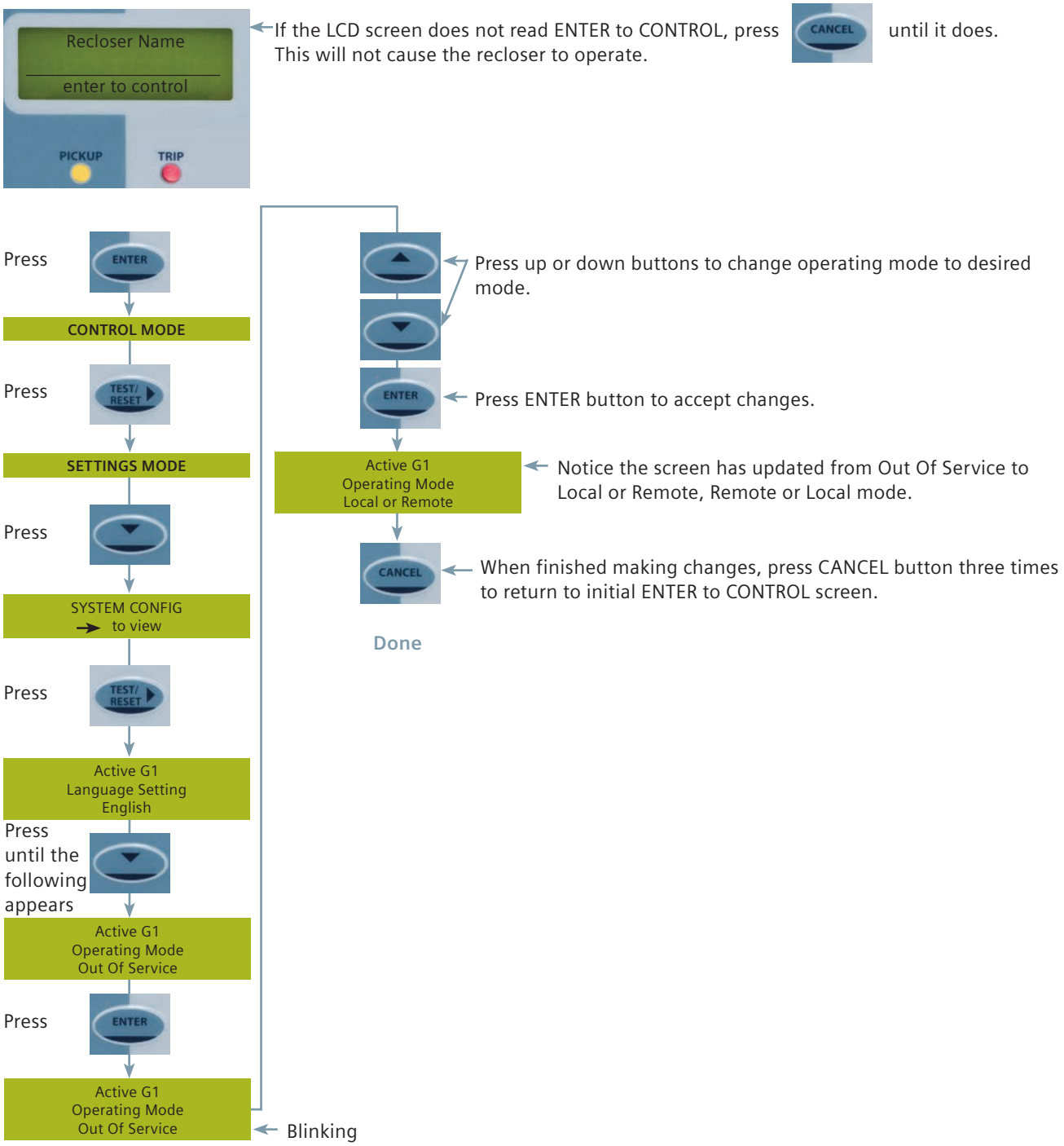
CANCEL

Done

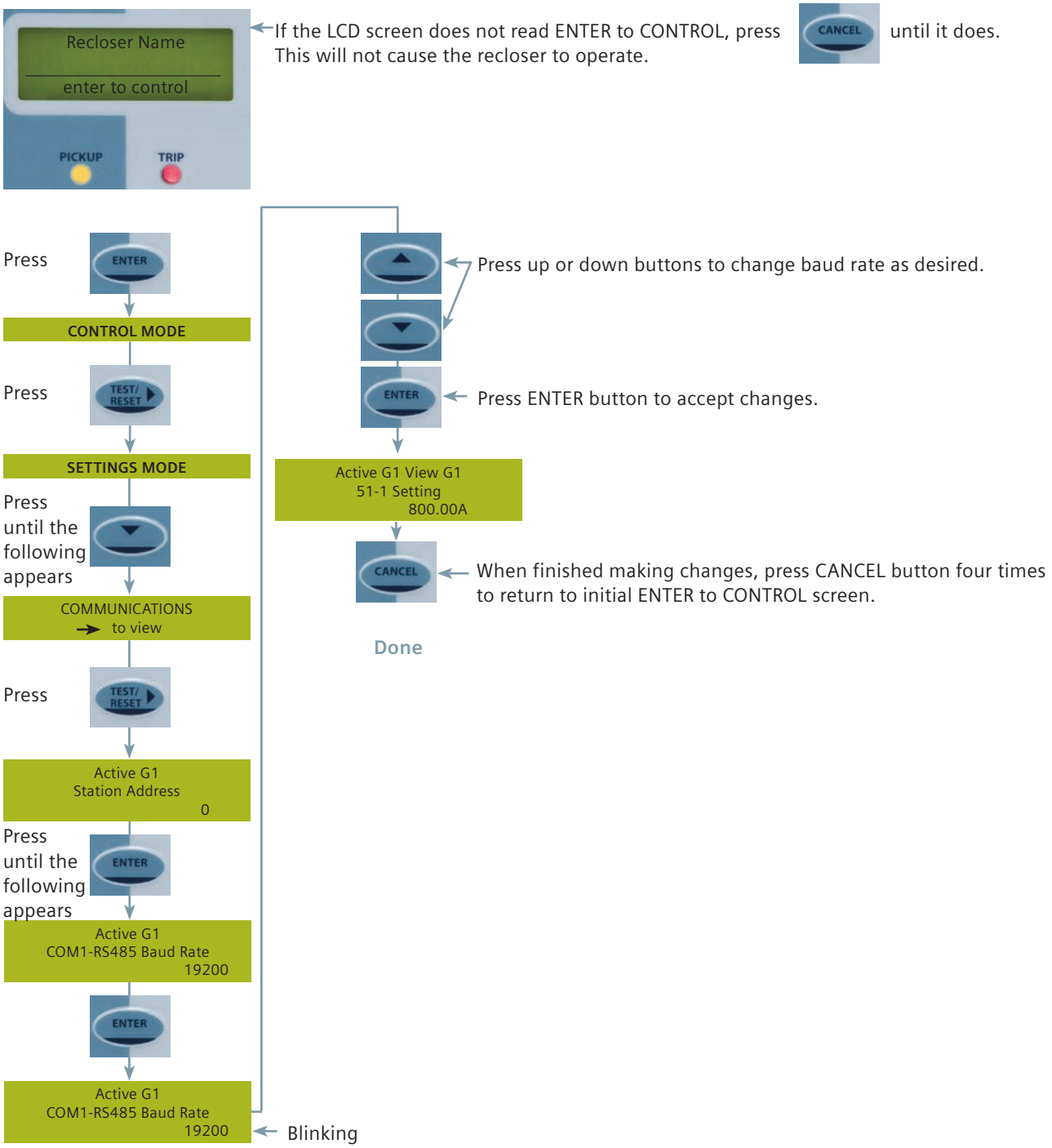
Note: "Active G1 View G1" means that the active group settings group is group 1. If this is not the group you wish to edit, follow the instructions in Example 2 on page 19 to change the settings group.

Note: "_xIn" refers to the value times the nominal current that equals the trip setting. In = 800 A for type SDR reclosers.

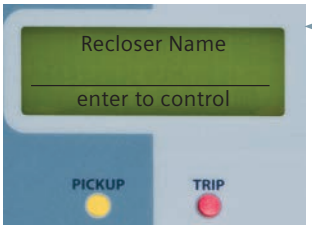
Example 5: changing the operating mode from the settings tree



Example 6: changing the baud rate on COM1



Example 7: manually initiating the battery test



If the LCD screen does not read ENTER to CONTROL, press

until it does.
This will not cause the recloser to operate.

Press

CONTROL MODE

Press until the following appears

Battery Test

Press

Battery Test
Confirm Start

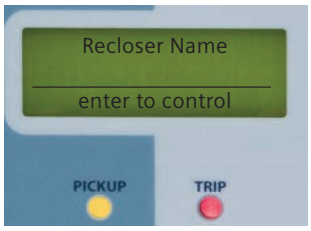
Press

Battery Test
Active

Note: Result will be displayed at end of test.

Done

Instrument mode tree



Press

CONTROL MODE → Press

→ SETTINGS MODE → Press

→ INSTRUMENT MODE

Press

This menu will allow the user to view the favorite meters. → FAVORITE METERS

Press

This menu will allow the user to view the current meters. → CURRENT METERS

Press

This menu will allow the user to view the voltage meters. → VOLTAGE METERS

Press

This menu will allow the user to view the frequency meters. → FREQUENCY METERS

Press

This menu will allow the user to view the power meters. → POWER METERS

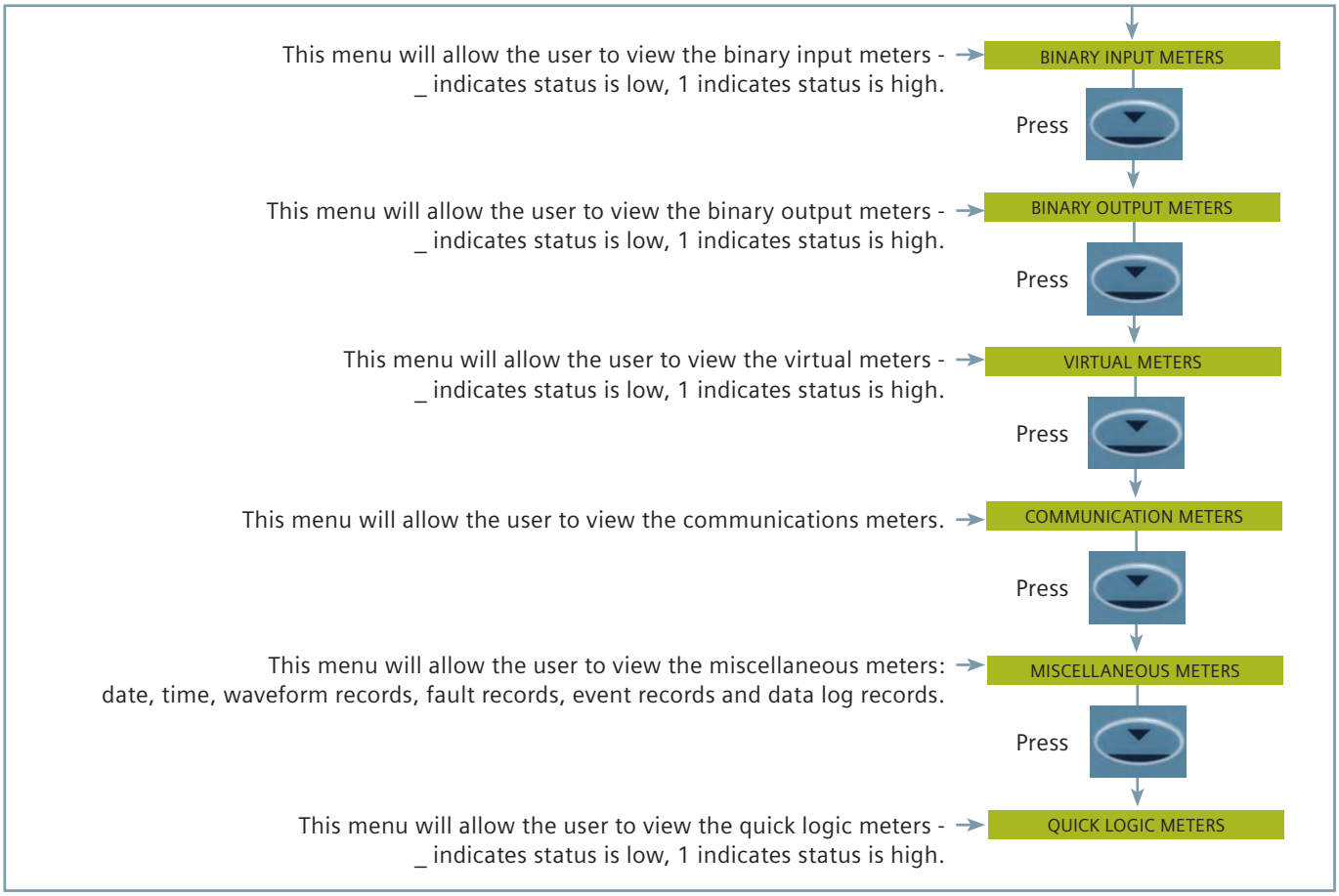
Press

This menu will allow the user to view the energy meters - active energy, reactive energy. → ENERGY METERS

Press

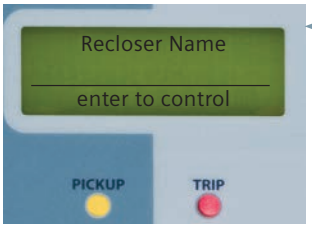
Instrument mode tree continues on page 27.

Instrument mode tree continues on page 28.


This menu will allow the user to view the binary input meters - _ indicates status is low, 1 indicates status is high.
BINARY INPUT METERS
Press
This menu will allow the user to view the binary output meters - _ indicates status is low, 1 indicates status is high.
BINARY OUTPUT METERS
Press
This menu will allow the user to view the virtual meters - _ indicates status is low, 1 indicates status is high.
VIRTUAL METERS
Press
This menu will allow the user to view the communications meters.
COMMUNICATION METERS
Press
This menu will allow the user to view the miscellaneous meters: date, time, waveform records, fault records, event records and data log records.
MISCELLANEOUS METERS
Press
This menu will allow the user to view the quick logic meters - _ indicates status is low, 1 indicates status is high.
QUICK LOGIC METERS

Viewing meter examples

Example 1: viewing the current meters and adding them to favorite meters



← If the LCD screen does not read ENTER to CONTROL, press CANCEL until it does.
This will not cause the recloser to operate.

Press ENTER

CONTROL MODE

Press TEST/RESET until the following appears

INSTRUMENTS MODE

Press ▼ until the following appears

Current Meters → to view

Press TEST/RESET

Primary Current
1a 0.00kA
1b 0.00kA
1c 0.00kA

Displays primary current levels.

Press ▼ ←

Press the down button to view other current meters:

- Secondary current
- Nominal current (for reclosers, In = 1A)
- Primary ground current
- Secondary ground current
- Nomimal ground current (for reclosers, In = 1A)
- I-sequence components
- Second harmonic current
- Last trip phase fault
- Last trip earth fault.

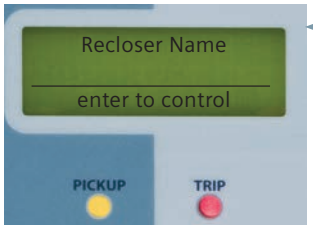
Press ENTER ← Press ENTER to make the meter a favorite meter.

Confirm
Add to Favorites
YES ← Blinking

ENTER ← Any meter or meters in the instrument mode may be added to favorite meters. The favorite meters may be displayed on the LCD screen, in rotating order, after no buttons have been pressed for a selectable period of time. To turn on and set the timer, select Setting Mode → System Config → Favorite Meters Timer.

Done

Example 2: viewing the voltage meters and adding them to favorite meters



← If the LCD screen does not read ENTER to CONTROL, press CANCEL until it does. This will not cause the recloser to operate.

Press ENTER

CONTROL MODE

Press TEST/RESET until the following appears

INSTRUMENTS MODE

Press ▼ until the following appears

Voltage Meters → to view

Press TEST/RESET

Primary Ph-Ph Voltage
Vab 0.00kV
Vbc 0.00kV
Vca 0.00kV

Displays primary phase-to-phase voltage levels

Press ▼

Press ENTER ← Press ENTER to make the meter a favorite meter.

Confirm Add to Favorites
YES ← Blinking

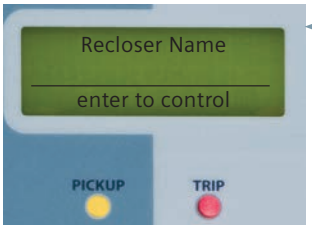
Press ENTER ← Any meter or meters in the instrument mode may be added to favorite meters. The favorite meters may be displayed on the LCD screen, in rotating order, after no buttons have been pressed for a selectable period of time. To turn on and set the timer, select Setting Mode → System Config → Favorite Meters Timer.

Done

Press the down button to view other voltage meters:

- Secondary phase-phase voltage
- Nominal phase-phase voltage (for reclosers, Vn = 63.5 V)
- Primary phase-neutral voltage
- Secondary phase-neutral voltage
- Nomimal phase-neutral voltage (for reclosers, Vn = 63.5 V)
- V-sequence components
- Calculated ground voltage
- CS/NVD voltage (VX)
- Last trip voltage.

Example 3: viewing the demand meters and adding them to favorite meters



If the LCD screen does not read ENTER to CONTROL, press CANCEL until it does.
This will not cause the recloser to operate.

Press ENTER

CONTROL MODE

Press TEST/RESET until the following appears

INSTRUMENTS MODE

Press ▼ until the following appears

Demand Meters → to view

Press TEST/RESET

V Phase A Demand
Max 0.00kV
Min 0.00kV
Mean 0.00kV

Displays phase A voltage demand

Press ▼

Press ENTER ← Press ENTER to make the meter a favorite meter.

Confirm Add to Favorites YES ← Blinking

ENTER

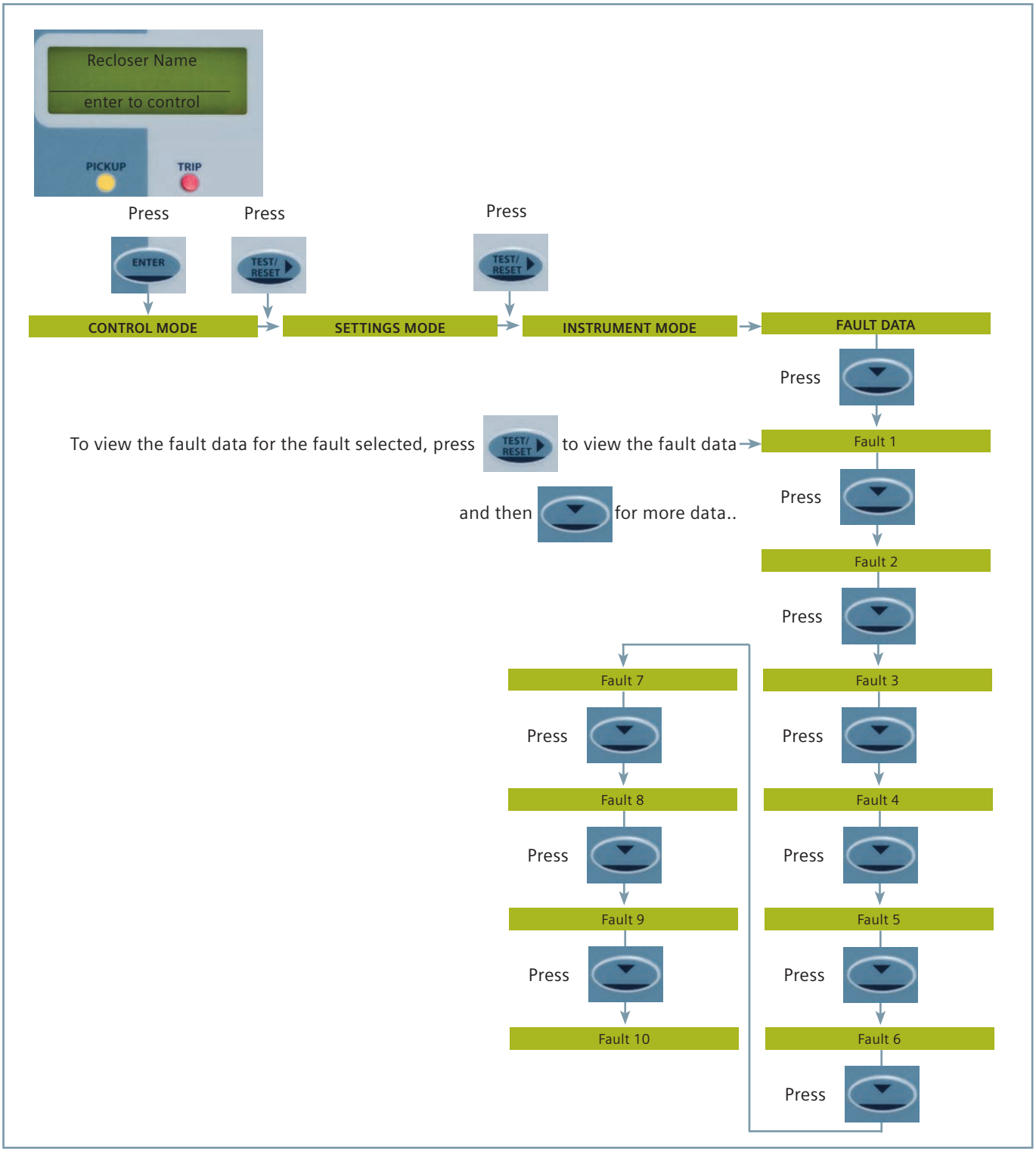
Done

Any meter or meters in the instrument mode may be added to favorite meters. The favorite meters may be displayed on the LCD screen, in rotating order, after no buttons have been pressed for a selectable period of time. To turn on and set the timer, select Setting Mode → System Config → Favorite Meters Timer.

Press the down button to view other demand meters:

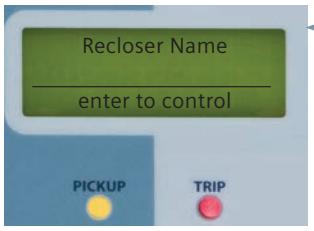
- Phase demand voltage (A, B and C)
- Phase-phase demand voltage (AB, BC and CA)
- Phase demand current (A, B and C)
- Ground demand current
- Power (P three-phase demand MW)
- Power (Q three-phase demand MVAR)
- Power (S three-phase demand MVA)
- Frequency demand.

Fault data mode tree



Viewing fault data example

Example 1: fault data record 1



If the LCD screen does not read ENTER to CONTROL, press CANCEL until it does. This will not cause the recloser to operate.

Press ENTER

CONTROL MODE

Press until the following appears TEST/RESET

FAULT DATA MODE

Fault 1 03/04/09
→ to view

Press TEST/RESET

Fault 1 Page 1/6
03/04/09
14:57:28:00.300

Displays date and time of Fault 1.

Press

Fault 1 Page 2/6
G1 51G 46BC 50BF-1
50-1 51-2

Displays elements that picked up during Fault 1.

Press

Fault 1 Page 3/6
Ia=0.304kA
Ib=0.000kA

Displays I_a and I_b levels during Fault 1.

Press

Fault 1 Page 4/6
Ic=0.304kA
In=0.060kA

Displays I_c and I_n levels during Fault 1.

Press

Fault 1 Page 5/6
Ig=0.060kA
Va=0.000kV

Displays I_g and V_a levels during Fault 1.

Fault 1 Page 6/6
Vb=0.000kV
Vc=0.000kV

Displays V_b and V_c levels during Fault 1.

Done

Troubleshooting

Malfunction	Remedy
'AUX Power OK' LED not illuminated	1. Check miniature circuit breaker CB1 and switch on if necessary. 2. Check the status of the auxiliary power supply.
'Recloser OK' LED not illuminated	Check the discharge switch on PCB2 circuit board and verify it is in the operating position.
Position indication shown as 'Travelling'	Travelling' indicated that no position indication signals are received from the recloser or that both open and closed signals exist simultaneously. 1. Check the recloser position. 2. Check the control cable.
Relay shows 'Out Of Service' and control mode and all buttons are not functional	Refer to example 5 on page 23 for instructions on returning the unit to desired operating mode.
Unit will not power up after a quick power cycle	Relay requires 10 seconds power down before rebooting. Remove power for this time interval and then restart.
A port error message is displayed	This error occurs when the relay chassis communications ports do not match the relay configuration. Replace the relay chassis with the proper model.
Relay does not appear to be responding as programmed	Verify that the 'Active' setting group matches the desired group number. Refer to examples 1 on page 19 and 2 on page 20.
Rear panel communications not functioning	Check the baud rate and parity settings for the selected communications port. Refer to example 6 on page 24.
Favorite meters do not display and scroll	Add desired meters to favorite meters and set favorite meters timer. Refer to Viewing Meter Examples beginning on page 29.

Notes

The information provided in this document contains merely general descriptions or characteristics of performance which in case of actual use do not always apply as described or which may change as a result of further development of the products. An obligation to provide the respective characteristics shall only exist if expressly agreed in the terms of contract.

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