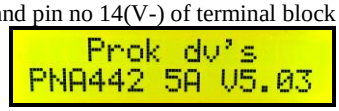
PROK DEVICES PRIVATE LIMITED
B-80, 2nd & 3rd Floor, KSSIDC Industrial Estate, 4th Main,
6th Block, Rajaji Nagar, Bengaluru- 560010
080-43487777, 080-43487700, Email: prokdvs@ blr.vsnl.net.in
www.prokdvs.com

SETTING PROCEDURE FOR PNA 442 V5.03 WITH 485 MODBUS (AUTO RESET)

STEP 1: Connect the suitable auxiliary supply (Refer wiring diagram) to Pin no 13(V+) and pin no 14(V-) of terminal block

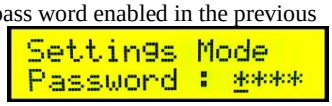


First display shows -

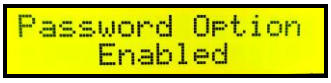
Display appears as in the main screen

Indicating the R phase, Y phase, B phase & E earth
Primary Current magnitude
Note: If the primary faults magnitude is above 1000A
Display as well as events recorded as 1.0 KA

STEP2: Hold the SET/ F-RST key for 3 sec, display changes to the Relay- setting mode, if pass word enabled in the previous



setting
Now enter the ***Factory set password – 1000***
(Press > key once and then press SET key three times)
And then display changes to the password option



Enable / disable mode.
In this mode password can be disabled by pressing
The > key / < key and then SET F-RST key

Then display change to Relay type (CT -Rated current)
Configuration mode
Now select the 1A/5A by using, the > key or < key and then press the SET/ F-RST key to go to primary CT Ratio configuration mode

In this mode, enter the CT Ratio by using the
The > key / < key. After selecting the CT Ratio, press the
SET/ F-RST key
NOTE: For example, CT used is 100/1
Enter CT Ratio as 100/1

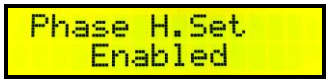
For example, CT used is 100/5
Enter CT Ratio as 100/5
Then Display changes to Phase low set Ps configuration mode,
In this mode enter the phase plug setting (ps)
By using the > key / < key in steps of 0.01
After selecting the (ps), Press the SET/ F-RST key
Note: For 5A Relay type, Phase current bandwidth ranges from [0.1 - 2.5]
Step size: 0.01

Display changes to phase curve selection mode, in this mode select any one of the following 7 IDMT characteristic curves or Definite Time for phase,

0. Normal Inverse
1. Extreme Inverse
2. Restricted Invr
3. Very Inverse
4. 1.3 sec's
5. 3 sec's
6. Long Time Delay
7. Definite Time
8. 0.6 Sec's

By using the > key /< key.
After selecting the IDMT Characteristic curve,
Press the SET/ F-RST, Display change to Phase TMS configuration mode
In this mode select the required phase time multiplier setting (TMS) by using

The > key / < key in steps of 0.01
After selecting the phase TMS
Press the SET/ F-RST key
Display changes to Phase High set enable or disable option mode,
In this mode select the Phase High set enable or disable option by using
The > key / < key



After selecting the Phase High set option
Press the SET/ F-RST key
Note: If the High set option was disabled display skips and changes to Next set Parameter
Display changes to Phase High set PS selection mode,

In this mode select the Phase High set PS by using
The > key / < key in steps of 0.1
After selecting the High set PS
Press the SET/ F-RST key
Display changes to Phase High set time selection mode,

In this mode select the Phase High set time by using
The > key / < key in steps of 0.1
After selecting the Phase High set time Press the SET/ F-RST key

Display changes to Earth low set Ps configuration mode

In this mode select the Earth low set Ps by using
The > key / < key in steps of 0.01
After selecting the Earth low set Ps Press the SET/ F-RST key
Display changes to Earth curve selection mode, in this mode select any one of the following 7 IDMT characteristic curves or Definite Time for earth

0. Normal Inverse
1. Extreme Inverse
2. Restricted Invr

3. Very Inverse
4. 1.3 sec's
5. 3 sec's
6. Long Time Delay
7. Definite Time
8. 0.6 Sec's

By using the > key /< key.
After selecting the IDMT Characteristic curve,
Press the SET/ F-RST, Display change to Earth TMS configuration mode
In this mode select the required Earth time multiplier setting (TMS) by using

The > key / < key in steps of 0.01
After selecting the Earth TMS
Press the SET/ F-RST key
Display changes to Earth High set enable or disable option mode,
In this mode select the Earth High set enable or disable option by using
The > key / < key

After selecting the Earth High set option
Press the SET/ F-RST key
Note: If the High set option was disabled display skips and changes to Next set Parameter

Display changes to Earth High set PS selection mode,
In this mode select the Earth High set PS by using
The > key / < key in steps of 0.1
After selecting the High set PS
Press the SET/ F-RST key

Display changes to Earth High set time selection mode,
In this mode select the Earth High set time by using
The > key / < key in steps of 0.1
After selecting the Earth High set time Press the SET/ F-RST key
Display changes to Phase L. Set Rly configuration Mode
In this mode select the phase L.Set trip either RLY 1 or RLY 2 by using

The > key / < key
After selecting the phase L.Set trip RLY
Press the SET/ F-RST key
Display changes to Phase H. Set Rly configuration Mode
In this mode select the phase H.Set trip either RLY 1 or RLY 2 by using

The > key / < key
After selecting the phase H.Set trip RLY
Press the SET/ F-RST key
Display changes to Earth L. Set Rly configuration Mode
In this mode select the Earth L.Set trip either RLY 1 or RLY 2 by using

The > key / < key
After selecting the Earth L.Set trip RLY
Press the SET/ F-RST key
Display changes to Earth H. Set Rly configuration Mode
In this mode select the Earth H.Set trip either RLY 1 or RLY 2 by using

The > key / < key
After selecting the Earth H.Set trip RLY
Press the SET/ F-RST key
Display changes to Auto Re close enable or disable option mode
Note: ***Default Relay 1-Low set trip (phase/earth)***
Relay 2-High set trip (phase/earth)
In this mode select the Auto Re close Enable option by using

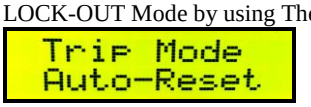
The > key / < key
After selecting the Auto Re close Enable option
Press the SET/ F-RST key
Display changes to Auto Re close Shot 1 Time selection mode
In this mode select the AR Shot 1 Time by using

The > key / < key in steps of 0.5 Min
After selecting the AR Shot 1 Time
Press the SET/ F-RST key
Display changes to Auto Re close Shot 2 Time selection mode
In this mode select the AR Shot 2 Time by using

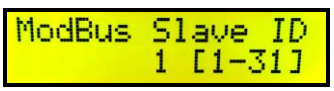
The > key / < key in steps of 0.5 Min
After selecting the AR Shot 2 Time
Press the SET/ F-RST key
Display changes to Auto Re close Shot 3 Time selection mode
In this mode select the AR Shot 3 Time by using

The > key / < key in steps of 0.5 Min
After selecting the AR Shot 3 Time
Press the SET/ F-RST key
Display changes to Auto Re close Shot 4 Time selection mode

In this mode select the AR Shot 4 Time by using
The > key / < key in steps of 0.5 Min
After selecting the AR Shot 4 Time
Press the SET/ F-RST key
NOTE: If AR Shot 1 time or AR Shot 2 time or AR Shot 3 time or AR Shot 4 time is set to 0.0 Min corresponding AR Shot time disabled
After the elapse of Re close time 1, 2, 3 & 4, Relay enter in to Lock out mode, then relay has to reset manually
If Auto Reclose Feature not required disable the Auto reclose function by using The > key / < key
After disabling the Auto reclose mode press SET/FRST key to store the changes
Display shows Trip mode Selection
In this mode select Either Auto- Reset Mode or
LOCK-OUT Mode by using The > key / < key



After Selecting the Required type of Trip mode press SET/FRST key to store the changes
Note: Auto Reset time- Default set to 5 Sec (Factory set)
Next Display changes to (Mod bus communication parameter settings)



In this mode select the Mod Bus Slave ID by using
The > key / < key in steps of 1

After selecting the Mod Bus Slave ID
Press the SET/ F-RST key
Display changes to Mod Bus Baud rate configuration mode
In this mode select the suitable Mod Bus Baud rate by using

The > key / < key

0. 1200 bps
1. 2400 bps
2. 4800 bps
3. 9600 bps
4. 19.2 kbps
5. 38.4 kbps
6. 115.2 kbps

After selecting the Mod Bus Baud rate, Press the SET/ F-RST key
Display changes to Date/ Month/ Year configuration mode

In this mode select YES (Y) option to edit the Date
In this mode select NO (N) option to retain the same Date
After selecting the edit Date option, Press the SET/ F-RST key
Display changes to Date/ Month/ Year Edit mode

In this mode Edit the Date / Month/ Year by using
The > key / < key
After selecting the Date / Month/ Year, Press the SET/ F-RST key
Display changes to Hour/ Min/ Sec configuration mode

In this mode select YES (Y) option to edit the Time
In this mode select NO (N) option to retain the same Time
After selecting the edit time option, Press the SET/ F-RST key
Display changes to HH/ MM/ SS Edit mode
In this mode Edit the HH/ MM/SS by using

The > key / < key
After selecting the HH/ MM/SS, Press the SET/ F-RST key

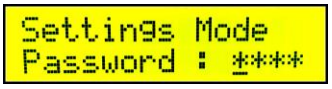
Display changes to save changes option
If the Save changes option is Yes (Y)

Entered parameters are saved in the memory
Then Display shows for a while

And comes back to main screen
If the Save changes option is NO (N)
Entered parameters are not saved in the memory and retain the last set Parameters and returns to main screen

NOTE: If none of the parameters were not edited in the setting mode data save changes option not appear in the setting mode.
Change CR 2032 Button cell after every 5 years for error free time/date format
This completes the setting procedure.
****

Step 3: TO view the stored data:
STEP2: Hold the SET/ F-RST key for 3 sec, display changes to the Relay- setting

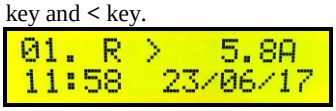


mode, if pass word enabled in the previous setting
Now enter the ***Factory set password – 1000***
(Press > key once and then press SET key three times)
And then display changes to the password option

Enable / disable mode.
n this mode password can be disabled by pressing
The > key / < key and then SET F-RST key
NOTE: If password is disabled and saved in the relay setting mode
***Setting password mode* was bypassed**

Display shows directly
NOTE: [While setting the parameters too much delayed >30 sec display time out occurs, and the entered settings are not updated user has to once again follow the steps setting procedure]

Step 4: TO view the trip events:
Hold the > key for 3 sec
Display changes to the last occurred fault event, last 99 events can be viewed by using the > key and < key.



For example;
Note: If the primary fault magnitude is above 1000A
Display as well as event recorded as 1.0 KA
Note: After 99 trip events trip events will be
Recorded on first in first out basis [FIFO] only
Step5: TO test the relay with trip mechanism
Hold the < key for 3 sec

Display changes to the relay trip test mode
Press > key to trip the relay with led & output relay ports in on position
Press < key to close the relay with led & output relay ports in off position (Reset)

User Parameters

Sl. No.	Parameter	Min Value	Max Value	Step Size	Dfault	Comment
1	Relay Rated Current	1	5		5	Amp's
2	CT Ratio for 5A	5	3000	5	5	
3	CT Ratio for 1A	1	3000	1	5	
4	Phase Curve	0	8	1	4	0 = Normal Inverse 1 = Extremely Inverse 2 = Restricted Inverse 3 = Very Inverse 4 = 1.3 Sec's Curve 5 = 3 Sec's Curve 6 = Long Time Delay 7 = Definite Time 8 = 0.6 Sec's Curve
5	Phase LowSet PS for 5A	0.10	2.50	0.01	0.50	
6	Phase LowSet PS for 1A	0.50	2.50	0.01	0.50	
7	Phase TMS	0.10	1.60	0.01	1.00	
8	Phase Definite Time	1.00	160.00	0.10	1.00	Sec's
9	Phase HighSet Option	0	1		1	0 = Disable 1 = Enable
10	Phase HighSet PS	2.00	30.00	0.10	5.00	
11	Phase HighSet Time	0.00	1.60	0.10	0.00	Sec's 0.00 = Instantaneous
12	Earth Curve	0	8	1	4	0 = Normal Inverse 1 = Extremely Inverse 2 = Restricted Inverse 3 = Very Inverse 4 = 1.3 Sec's Curve 5 = 3 Sec's Curve 6 = Long Time Delay 7 = Definite Time 8 = 0.6 Sec's Curve
13	Earth LowSet PS	0.10	0.80	0.01	0.50	
14	Earth TMS	0.10	1.60	0.01	1.00	
15	Earth Definite Time	1.00	160.00	0.10	1.00	Sec's
16	Earth HighSet Option	0	1		1	0 = Disable 1 = Enable
17	Earth HighSet PS	0.50	16.00	0.10	5.00	
18	Earth HighSet Time	0.00	1.60	0.10	0.00	Sec's 0.00 = Instantaneous
19	Phase LowSet Relay	1	2		1	1 = Upper Relay 2 = Lower Relay
20	Phase HighSet Relay	1	2		2	
21	Earth LowSet Relay	1	2		1	
22	Earth HighSet Relay	1	2		2	
23	Auto Reclose Option	0	1		0	0 = Disable 1 = Enable
24	AR Shot1 Time	0.00	10.00	0.50	0.50	Min's 0.00 = Shot Bypass.
25	AR Shot2 Time	0.00	10.00	0.50	0.50	
26	AR Shot3 Time	0.00	10.00	0.50	0.50	
27	AR Shot4 Time	0.00	10.00	0.50	0.50	
28	ModBus Slave ID	1	31	1	1	

29	Baud Rate	0	6	1	3	0 = 1200 bps 1 = 2400 bps 2 = 4800 bps 3 = 9600 bps 4 = 19.2 kbps 5 = 38.4 kbps 6 = 115.2 kbps
30	Date	1	31	1	1	
31	Month	1	12	1	9	
32	Year	0	99	1	10	
33	Hour	0	23	1	10	
34	Minutes	0	59	1	10	
35	Seconds	0	59	1	0	

ModBus Address Map

Read Registers

Function Code : 03 (Read Holding Register)

Address	Description	Data Type	Comment
40001	Relay Rated Current	16 Bit	
40002	CT Ratio for 5A	16 Bit	
40003	CT Ratio for 1A	16 Bit	
40004	Phase Curve	16 Bit	
40005	Phase LowSet PS for 5A	16 Bit	Represents float, 100 = 1.00
40006	Phase LowSet PS for 1A	16 Bit	Represents float, 100 = 1.00
40007	Phase TMS	16 Bit	Represents float, 100 = 1.00
40008	Phase Definite Time	16 Bit	Represents float, 100 = 1.00
40009	Phase HighSet Option	16 Bit	
40010	Phase HighSet PS	16 Bit	Represents float, 100 = 1.00
40011	Phase HighSet Time	16 Bit	Represents float, 100 = 1.00
40012	Earth Curve	16 Bit	
40013	Earth LowSet PS	16 Bit	Represents float, 100 = 1.00
40014	Earth TMS	16 Bit	Represents float, 100 = 1.00
40015	Earth Definite Time	16 Bit	Represents float, 100 = 1.00
40016	Earth HighSet Option	16 Bit	
40017	Earth HighSet PS	16 Bit	Represents float, 100 = 1.00
40018	Earth HighSet Time	16 Bit	Represents float, 100 = 1.00
40019	Phase LowSet Relay	16 Bit	
40020	Phase HighSet Relay	16 Bit	
40021	Earth LowSet Relay	16 Bit	
40022	Earth HighSet Relay	16 Bit	
40023	Auto Reclose Option	16 Bit	
40024	AR Shot1 Time	16 Bit	Represents float, 100 = 1.00
40025	AR Shot2 Time	16 Bit	Represents float, 100 = 1.00
40026	AR Shot3 Time	16 Bit	Represents float, 100 = 1.00
40027	AR Shot4 Time	16 Bit	Represents float, 100 = 1.00
40028	Baud Rate	16 Bit	
40029	Clock – Hour	16 Bit	
40030	Clock – Minutes	16 Bit	
40031	Clock – Seconds	16 Bit	
40032	Clock – Date	16 Bit	
40033	Clock – Month	16 Bit	
40034	Clock – Year	16 Bit	00 to 99
40035	Relay Model	16 Bit	See Ref[1]
40036	R Phase Magnitude – LS Word	16 Bit	Represents float, 100 = 1.00
40037	R Phase Magnitude – HS Word	16 Bit	
40038	Y Phase Magnitude – LS Word	16 Bit	Represents float, 100 = 1.00
40039	Y Phase Magnitude – HS Word	16 Bit	

40040	B Phase Magnitude – LS Word	16 Bit	Represents float, 100 = 1.00
40041	B Phase Magnitude – HS Word	16 Bit	

40042	Earth Magnitude – LS Word	16 Bit	Represents float, 100 = 1.00
40043	Earth Magnitude – HS Word	16 Bit	
40044	Trip Status	16 Bit	See Ref[2]
40045	Trip Magnitude – LS Word	16 Bit	Represents float, 100 = 1.00
40046	Trip Magnitude – HS Word	16 Bit	
40047	Trip Time – Hour	16 Bit	
40048	Trip Time – Minutes	16 Bit	
40049	Trip Time – Seconds	16 Bit	
40050	Trip Time – Date	16 Bit	
40051	Trip Time – Month	16 Bit	
40052	Trip Time – Year	16 Bit	00 to 99
40053	Trip Type	16 Bit	0 = Lock-Out, 1= Reset

Ref[1] : Relay Models

ID	Model Number	Description
0	PNA442	3 Over Current + 1 Earth Fault Relay
1	PNA430	3 Over Current Relay
2	PNA420	2 Over Current Relay
3	PNA410	1 Over Current Relay
4	PNA422	2 Over Current + 1 Earth Fault Relay
5	PNA402	1 Earth Fault Relay

Ref[2] : Trip Status Description

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	0	High Set	Low Set	E	B	Y	R

Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
0	0	0	LockOut	Reclose4	Reclose3	Reclose2	Reclose1

Write Registers

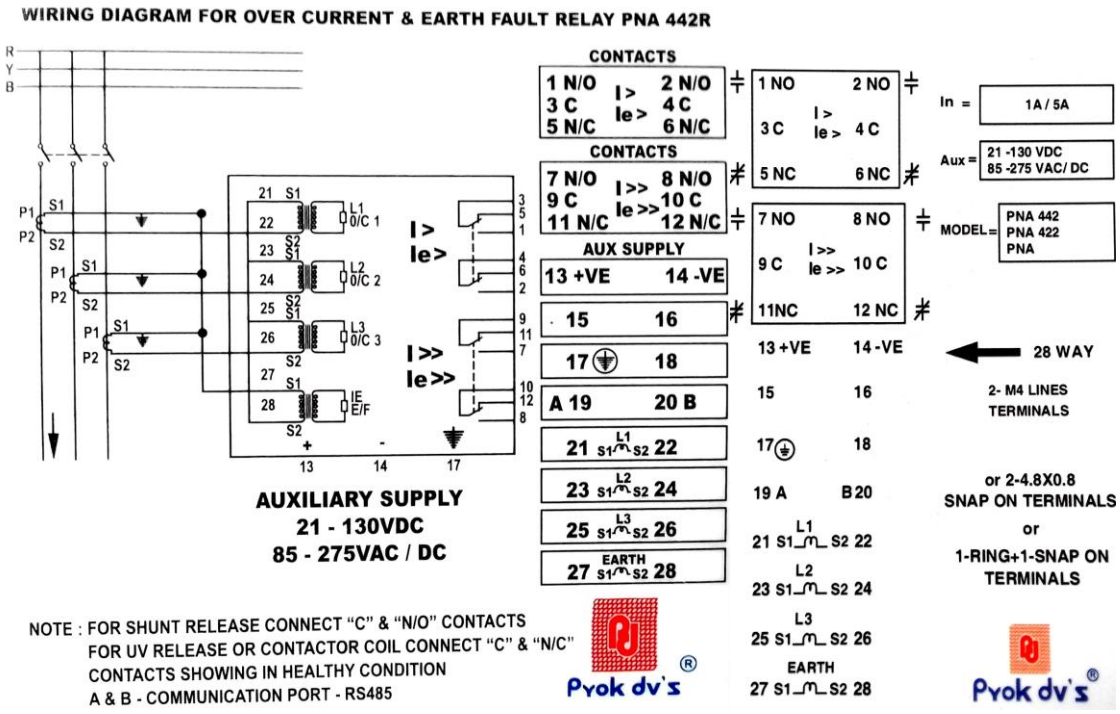
Function Code : 06 (Preset Single Register)

Address	Description	Data Type	Comment
60001	Relay Rated Current	16 Bit	
60002	CT Ratio for 5A	16 Bit	
60003	CT Ratio for 1A	16 Bit	
60004	Phase Curve	16 Bit	
60005	Phase LowSet PS for 5A	16 Bit	Represents float, 100 = 1.00
60006	Phase LowSet PS for 1A	16 Bit	Represents float, 100 = 1.00
60007	Phase TMS	16 Bit	Represents float, 100 = 1.00
60008	Phase Definite Time	16 Bit	Represents float, 100 = 1.00
60009	Phase HighSet Option	16 Bit	
60010	Phase HighSet PS	16 Bit	Represents float, 100 = 1.00
60011	Phase HighSet Time	16 Bit	Represents float, 100 = 1.00
60012	Earth Curve	16 Bit	
60013	Earth LowSet PS	16 Bit	Represents float, 100 = 1.00
60014	Earth TMS	16 Bit	Represents float, 100 = 1.00
60015	Earth Definite Time	16 Bit	Represents float, 100 = 1.00
60016	Earth HighSet Option	16 Bit	
60017	Earth HighSet PS	16 Bit	Represents float, 100 = 1.00
60018	Earth HighSet Time	16 Bit	Represents float, 100 = 1.00
60019	Phase LowSet Relay	16 Bit	

60020	Phase HighSet Relay	16 Bit	
60021	Earth LowSet Relay	16 Bit	
60022	Earth HighSet Relay	16 Bit	
60023	Auto Reclose Option	16 Bit	
60024	AR Shot1 Time	16 Bit	Represents float, 100 = 1.00
60025	AR Shot2 Time	16 Bit	Represents float, 100 = 1.00
60026	AR Shot3 Time	16 Bit	Represents float, 100 = 1.00
60027	AR Shot4 Time	16 Bit	Represents float, 100 = 1.00
60028	Baud Rate	16 Bit	
60029	Clock – Hour	16 Bit	
60030	Clock – Minutes	16 Bit	
60031	Clock – Seconds	16 Bit	
60032	Clock – Date	16 Bit	
60033	Clock – Month	16 Bit	
60034	Clock – Year	16 Bit	00 to 99
60035	Trip Reset	16 Bit	1 = Trip Reset
60036	Trip Type	16 Bit	0 = Lock-Out, 1= Reset

NOTE : Relay will not respond to Write Register query in the following cases,

- When the user is in the settings mode.
- When the relay has been picked up for the fault.



Note: Do Not Connect Terminals 19 & 20 (A& B Of Rs 485) For Hv Test
RS 232 Port is provided on the front facia